FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

Raw Material for British Boxmaking

THE boxmaking industry in Britain, which formerly fed the fruit and food trades importing to Britain, but whose business has been increasingly decreased by competition from Sweden, Finland and other timber-producing countries, is now anxious to ensure that an adequate supply of raw materials will be available to them post-war. Without adequate imported quantities of raw material suitable for boxmaking, the industry in Britain cannot hope to compete with foreign competition, and efforts to control imported made boxes has resulted in a decreasing quantity of raw material.

As the position is of prime importance to all food producers in Britain and the Dominions (inasmuch as the two-way service of exported boxes and imported food helps to materially reduce the final costs to all concerned, as against a one-way food traffic only), moves are being made to ensure that an adequate supply of scantlings, battens, deal and board ends will be made available post-war to British boxmakers.

A member of the industry makes the suggestion that a deal could be made on the following lines. Britain will be forced to import a very large quantity of manufactured timber for building and other constructional purposes. Foreign countries, as much as Empire growers, will be only too anxious to co-operate as exporters. In making future arrangements for such imports of manufactured timbers, provision ought to be made for a minimum fixed percentage of the total annual value of the timber shipped to consist of deal, batten, scantlings and boards of small diameter roundwood suitable for the manufacture of wooden boxes and crates.

Unless supplies of this type are secured, the recovery and development of the British boxboard industry is impossible. If they are freely available, not only will the home trade be recovered but the development of export trade to the British Dominions assured against their sales of foodstuffs to us. Our shipping industry would also be assisted by obtaining a two-way traffic from the establishment of such a provision.

The proposal is obviously one which demands further consideration.

U.S. Post-War Trade and the Rice Industry

In his presidential address to the forty-fifth annual meeting in New York of the United States Rice Millers Association the retiring president, E. H. Steinhagen, said that rice-growers of the U.S. face the menace of a glutted market when peace comes and Government purchases for the armed forces and Allied nations cease. "There are two avenues of escape from such a situation," he said. "A drastic curtailment of production or the development of increased uses and additional markets. Quite possibly we will be forced to take steps in both directions." In speaking of the glutted market, Mr. Steinhagen said: "This eventually cannot be escaped unless a careful, and I might say lucky, plan is made. The collapse of Germany would strike a warning bell. However, the American rice industry will not be endangered until the trade channels of the Far East are liberated. This area produces 95 per cent. of the world's supply of rice." The problem for the U.S. has been further aggravated by the increase in production in Central and South America. Within the last two or three years these countries have changed from importers to exporters of rice. "It is not realistic," Mr. Steinhagen said, "to imagine that the U.S. might engage in world trade with our standard of costs unless some reciprocal trade is made with our customer. Reciprocal trade agreements are not likely unless there can be some exchange that will benefit both countries. Therefore it is reasonable to believe that our Cuban market will be preserved under this premise. Cuba has sugar to sell; we have rice to sell. Trade with Puerto Rico and other island possessions should be assured."

Food and the Healing of Wounds

It has long been recognised that previous good health and nutrition are great assets to a wounded man. In a leading article the *Lancet* (June 3, 1944) gives a useful review of the research that has been carried out during the past few years.

Protein deficiency, as indicated by a low level of serum proteins, may be an important cause of the dehiscence of wounds. The diet as a whole must be considered because both carbohydrate and fat have a protein sparing action. Sepsis, malaise and toxæmia all interfere with appetite and may render the task of feeding the patient so difficult that a vicious circle establishes itself. It was with the idea of breaking this circle (states the writer) that the intravenous administration of amino-acids was first taken up in America. Elman began to treat human beings in this way in 1939, and has emphasised the importance of relieving hypoproteinæmia whenever it is encountered in a surgical patient. He recommends a free use of plasma transfusion and the introduction of amino-acid mixtures intravenously, casein hydrolysates being usually employed for this purpose. The reports on this form of medication have, to say the least, been encouraging, and the military operations now proceeding should provide an opportunity of confirming them.

The writer goes on to consider the work on vitamins. Deficiencies of several of them reduce the ability of experimental animals to survive a general infection, and the same may apply to man. It has long been known that scurvy delays the healing of fractures, and there is now ample experimental evidence that slighter deficiencies of vitamin C interfere with the normal processes of bone repair, though the union of fractures cannot be hurried by giving an excess of the vitamin. A recent paper by Bourne, published in the *Lancet*, May 27, 1944, page 688, has confirmed previous findings on the influence of vitamin C deficiency on soft-tissue healing. Hunt demonstrated a close correlation between the histology of the wounds and the amount of vitamin C in the tissues, the wounds which were most deficient in vitamin C showing the poorest production of collagen. Bourne has confirmed that the tensile strengths of wounds in guinea-pigs vary with the doses of ascorbic acid given, and that a wound which is histologically normal may still be mechanically weak. Boston workers suggest that the maximal saturation of the tissues with vitamin C may increase their resistance to infection, and infection is a potent cause of reduced tensile strength in wounds.

The writer concludes by saying that we will do well to give wounded men enough vitamin C in one form or other to keep them saturated, and here fortunately there is no need to wait upon a sick man's appetite. The ideal should be to give them a full mixed diet, high in calorie value and in protein and vitamin content, supplementing it to meet special circumstances. When this is impracticable, the best endeavours must be made to see that they do not fall short in protein and vitamin C.

Ice Cream Hopes

From a further conference between the Minister of Food and a representative of the Ice Cream Alliance there appears to be little doubt that Colonel Llewellin would have authorised the resumption of ice cream manufacture early in the 1944 season if he had been satisfied that such a course were practicable. But he intends to permit manufacture as soon as certain difficulties have been overcome; meanwhile he has made an "interim decision" on the case put before him on behalf of the trade that the Prohibition Order must remain in force for the present.

The fly in the ointment is labour—not the labour for manufacturing ice cream, but that required to distribute the ingredients to the manufacturers. The Alliance is stated to have asked for only 3,000 tons of sugar and fat per annum for the entire industry. This is a very small quantity from the Ministry's viewpoint, and the stocks are available. But the great majority of ice cream manufacturers are small concerns, and consequently these 3,000 tons would have to be split up into an unusually large number of parcels. The Ministry of Labour has taken the view that man-power is not available for the job. Colonel Llewellin is hoping, however, that the difficulty will be overcome.

Ice cream manufacturers regard the Ministry of Labour's attitude as absurd. They declare that most of their number, although often one-man businesses, already receive allocations of sugar and/or fat in connection with their catering businesses, milk bars, soda fountains and so on. A supply of ingredients for ice cream would merely increase the size of their present allocations, and would not necessitate the making up of "a large number of parcels." No extra labour would be required as the ice cream makers would draw their ingredients from their present wholesalers.

It is suggested that the Alliance should discuss with Professor Sir Jack Drummond, the Ministry of Food's chief nutrition expert, the question of the most nutritious ice cream mix that can be made with the ingredients now available. Liquid milk cannot be used, and it is doubtful whether skim milk powder or condensed milk would be available. On the other hand, dried egg-powder and soya flour are believed to be in adequate supply.

Post-War Cream

Speaking at a Press Conference in London, Mr. R. S. Hudson, Minister of Agriculture, expressed the hope that after the war cream would no longer be a luxury for a limited section of the public as it had been before the war; but he declined to be drawn into a discussion of the means by which he hopes the change will be brought about.

Trade circles believe that the question is linked not only with the Government policy on nutrition, but also with the principle laid down in the White Paper on employment policy that manufacturers must seek the reward for their labour, after the war, in increased production rather than in higher prices. If cream is to be available to all classes of the public the output must be very much greater than it was before the war, and the price must be considerably lower. What are the prospects of achieving these results?

Before the war the price of cream was so high that the separated milk was often sold below its real value; in Northern Ireland it was sometimes given away. Mr. Hudson believes that restrictions on the importation of animal feeding-stuffs will be necessary for some years after the war because of financial considerations. Separated milk should therefore be in demand for feeding to livestock. This product should fetch its fair market price, thus permitting a reduction in the price of cream.

The demand for skim milk powder is expected to continue at a high level after the war, and England has now the largest skim milk powder plant in Europe. The cream from this and other S.M.P. plants may be marketed as cream and not manufactured into butter.

The fact that the Government has decided to guarantee farmers' milk pool prices until 1948 is believed to imply that the Government will also control the utilisation of milk until that date. In that case the output of cream would be determined by the Ministry of Food during the transition period from war to peace. At least four years will be required to increase the national output of milk by 350,000,000 gallons per annum. Mr. Hudson regards that increase as a minimum national requirement. Most of that increase will be required for liquid consumption. There may, in fact, be little or no surplus available for manufacture in winter, but a higher official of the Ministry of Agriculture expressed the view that an increase of 350,000,000 gallons in the annual production should leave a useful summer surplus for manufacture. He believed that 25 per cent. cream would displace the 50 per cent. product as the most popular grade.

High Frequency Heat in Meat Plant

M. T. Zarotschenzeff, of National Frosted Foods, Inc., originator of the "Z" method of quick freezing, believes that there are great possibilities in the application of high frequency electric heating to various packing-house processes. He spent some time in California recently in research on quick freezing and meat cooking and will leave for Brazil within a short time to put some of his ideas into practice.

Mr. Zarotschenzeff says that his new method of cooking meat will raise the internal temperature to 154° F. within a few minutes and has little effect on the appearance or the moisture content of the product.

He points out that a quick, low-shrink method of cooking meat is not only applicable to such meat plant processes as smoking and the manufacture of sausage and the rendering of fats, but that it could also be used as a method of sterilising South American beef for importation into the United States. He points out that boneless beef or lamb might be pre-cooked in this manner, packed in 5- to 50-lb. containers, quick frozen and shipped to the United States. Characteristics of the meat would not be much modified by such treatment, and little of its vitamin content would be lost.

The Herring Industry

Few Government Bills dealing with food products have, in recent years, met with more universal support from all parts of the House than the Herring Industry Bill which has just passed through the Commons. Its purpose is to give effect to some of the recommendations contained in the Elliot Committee's Report on the herring industry; other recommendations can be brought into effect without the need for legislation.

Mr. Tom Johnston, in moving the second reading, gave important information about the experiments in refrigeration and dehydration of herring now being carried out at the Torry Research Station, Aberdeen. These trials are being conducted by the Department of Scientific and Industrial Research, with Dr. Rae in charge. Experiments on a semi-commercial scale have now been arranged. A start has been made with five cran daily, to be increased to ten cran later. Frozen herring are being stored at varying temperatures. The cost of dehydration to date has averaged about one-third of a penny per herring, but the saving in distribution costs will exceed that sum. The total cost of freezing over a period of six months is estimated at less than a halfpenny per pound. Hopes are therefore entertained that these new processes will do much to solve the problem of gluts in post-war years.

Mr. Loftus declared that irreparable damage has been done to the industry "by the invention of the abominable dyed kipper." Mr. Francis Beattie was also critical of dyeing, and suggested that the Herring Industry Board (now in abeyance) must see that establishments are closely inspected, particularly at the dyeing stage.

To what extent is such criticism justified? The trade must meet the public requirements. London and the South of England like kippers to be a dark shade; the Midlands prefer them a yellowy colour; while Scotland seems to have no favourite shade. Then, again, curers are obliged to face the fact that, in general, people prefer kippers less highly smoked than did their grandfathers; and in Glasgow there is a big demand for kippers that are not smoked at all. The general tendency is to reduce the smoking because of the change in public taste. Nevertheless, there is said to be a handful of curers who deliberately restrict the smoking of kippers in the hope of making a higher profit. The Herring Industry Board, on resuming activity, will have ample powers to deal with such matters and may, in fact, insist on a uniform cure. It would not follow, however, that the Board would also insist on a uniform colour.

The Bill provides for grants up to a total of £820,000 over a period of five years towards the provision of boats, nets and gear. The grants may cover up to one-third of the total cost, but some members of the House thought that this proportion should be increased. This is the first time that grants have been made available for nets and gear. The Board will also have power to purchase and equip boats and hire them to fishermen; to prepare schemes for the processing of herring so as to avoid gluts; and to make levies so as to equalise to some extent the earnings of herring fishermen.

Scottish Food Production

At a preview of the Canning Committee of the Scottish Council on Industry, the foods which Scotland can produce post-war and which are now in active production and use on the battle fronts of the world were discussed. Commercial progress has been made with milk, potatoes, and vegetables. Fish is being dehydrated in four forms: herring, kipper, fresh and smoked cod.

The kippering and smoking processes add considerably to the keeping properties of the fish. The fish is boned mechanically, minced, dehydrated and then gas-packed. It will keep, as a minimum, for one year. It is stated that when the dehydrated fish is compressed it will keep for a much longer period and that it is possible to dispense with gas-packing.

The meeting, at which samples of many different foods were on view, indicates that the Canning Committee of the Scottish Council on Industry has been very active and that the present work for the Forces is leading to the accumulation of a valuable store of knowledge for post-war application.

The "Development Lag"

It is now generally agreed that although British scientific research is equal to any in the world it has been behind the U.S.A., and possibly Germany and Russia, in developing from the laboratory to the commercial scale. British policy in the past has been to "let the other men make the mistakes." This has often meant that the scientific discoveries made in Great Britain have been developed abroad and have afterwards been brought back with heavy royalty obligations to the foreigner.

We are liable, through sheer inability to supply the desired products, to lose markets essential for our balance of trade if we do not achieve at least parity with other countries in the "development lag." There is little hope of redressing the balance without more positive action than has hitherto been proposed.

It is with a view to working out the details of such action that the Parliamentary and Scientific Committee has under discussion a Development Fund, and there seems to be general agreement that such a fund, properly administered, could help to solve the problem. Details are not yet available, but will be awaited with interest.

Air Conditioning in the Food Factory

FRANK H. SLADE, A.M.I.Mech.E.

THE production of a controlled atmosphere in food factories is one of the many striking developments in manufacturing methods recorded in the last decade or so.

The advantages attached to air conditioning are manifold and principal among these is the high degree of uniformity conferred upon finished products by the supply to the factory of fresh air, entirely cleansed of dust, bacteria, moulds and soluble gases, at the required temperature and humidity. In this way summer and winter production curves are straightened out and can be planned in advance, irrespective of external atmospheric conditions.

Among the products of the food industry which particularly benefit from the installation of air conditioning are : flour, bread, cereal foods, milk, cheese, bacon, lard and dairy substitutes, egg products, confectionery, dried fish and fruit and sugar.

Air conditioned stores allow perishable goods to be kept for reasonable periods to satisfy production demands and to avoid to some extent seasonal rushes, thus minimising plant and equipment and avoiding stand-off of labour. This feature is apart from the need of air conditioned stores for the essential safe keeping of commodities which would be spoilt in a very short time.

Air Conditioning Plant

Practically every system of air conditioning is used in the food industry and many forms of control are adopted to comply with the exacting limits imposed by the requirements. Cooling and dehumidifying are closely related in most air conditioning work, a reduction in both temperature and humidity being necessary to produce the requisite conditions. Consequently, cooling and dehumidification must in most cases be considered together, not as two separate problems, although each can be accomplished separately. There are two methods—direct and indirect. The first is carried out by fitting direct expansion coolers in the actual air stream, the refrigerant flowing through extended surface or fin coils, and absorbing the heat from the air stream. Indirect cooling, as the name implies, is effected by cooling the air passing through the air conditioning plant by an independent unit, usually in the form of a shell and tube cooler, consisting of an outer casing with end plates into which tubes are expanded, the water flowing through the tubes surrounded by the refrigerant in the outer casing.

Unit air coolers and air conditioners are designed to meet the specific requirements of those food factories in which it is not considered necessary to install a more elaborate cooling system. Fig. 1 illustrates a unit air cooler which consists of a battery of finned copper tubes, housed in a casing which is provided with a propeller-type circulating fan.

The cooling coils are connected in parallel and supplied with chilled water from refrigerating equipment placed at some convenient place away from the conditioned enclosure; the chilled water is recirculated to the refrigerating plant after use for recooling. Unit coolers of this type may also be employed for dehumidification purposes if arrangements are made to drain away the condensed water vapour.

The Flour Mill

The essential initial materials of the flour mill are wheat and air. The miller judges the finished product by studying the quality, weight, size, degree of firmness, and " look " of the wheat.

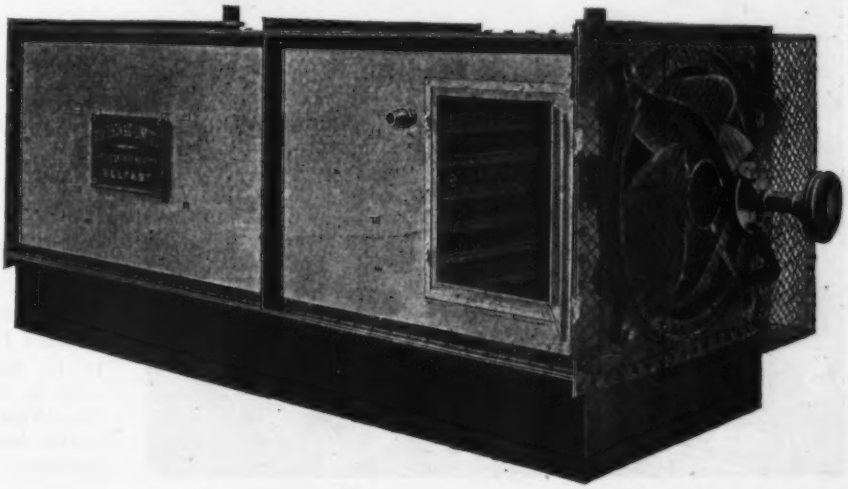


Fig. 1.—A Unit Air Cooler which consists of a battery of finned copper tubes housed in a casing which is provided with a propeller-type circulating fan. Unit coolers of this type may also be employed for dehumidification purposes if arrangements are made to drain away condensed water vapour.

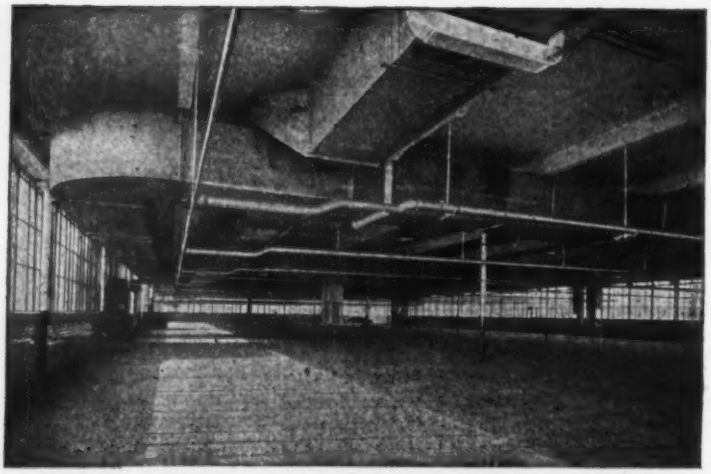


Fig. 2.—Flour should be stored in an air conditioned room in order to maintain its normal moisture content and preserve its quality; the conditions required in the room are 78° F. and 70 to 75 per cent. relative humidity. This picture illustrates the ductwork installed in a large bakery for the distribution of conditioned air.

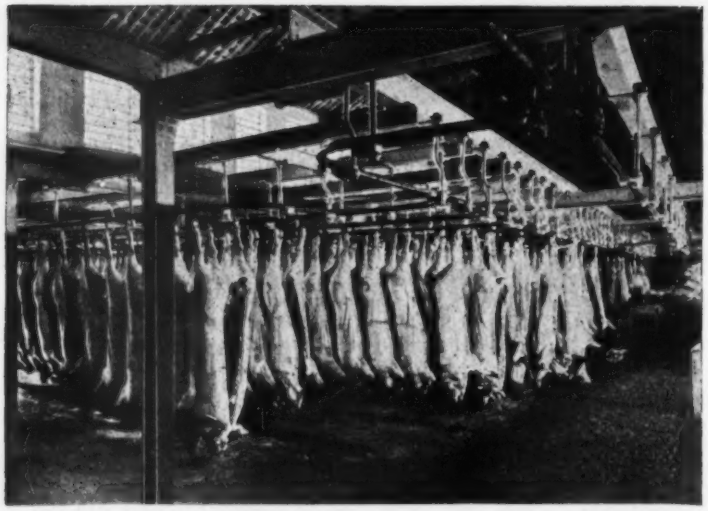


Fig. 3.—Bacon calls for fully air conditioned plant in the different stages of manufacture. This is a view of a hanging-hall in a large bacon factory equipped with air conditioning plant. Air conditioning is also used in the chill-room, curing-room, pluck-room and feet-curing room.

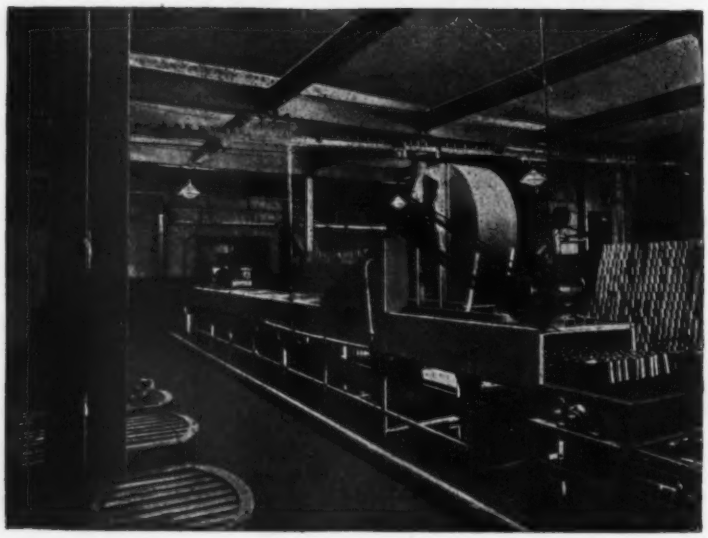


Fig. 4.—Direct air cooling alone is used for many purposes; one of its most important applications is in the canning industry. The illustration shows a cooling plant installed in the canning factory.

Contrasted with the close study wheat receives, the other ingredient, air, has had scant attention until the last decade or so.

Air has intimate contact with the wheat plentifully at all stages of the milling process. It was not appreciated until recently that the products of wheat are very hygroscopic and can be affected for good or ill according to the kind of air to which they are subjected. The relative humidity, temperature and cleanliness of air in the mill are important factors. Flour, as an important food, should be milled clean and kept clean. In its finished state it is very finely divided and atmospheric dust can mix with it readily. Temperature is important both on account of the comfort of the workers and for other reasons which have to do with the adjustment of the machines and the rate of flow of the wheat products from one machine to the next.

In addition to improving the operation of a flour mill, there is the possible prevention of loss (from half to 1 per cent. of the raw material). This loss, owing to evaporation of moisture from the raw product, may adversely affect the quality of the flour.

The best general purpose flour has a moisture content of between 13·5 and 14 per cent. (determined by exposure for five hours at 100° C.). Wheat enters the mill at varying moisture contents of from 20 to 10 per cent. Any deficiency in moisture content in the wheat can to some extent be made up by " tempering " or soaking in water and the excess removed by conditioned drying, but even with these processes the condition of the flour at the end of the process may be very much " in the lap of the gods." The only way that flour can be delivered to the packaging machines at the desired moisture content is by the control of evaporation during the period during which the wheat products are in the process of being milled. This, in turn, means control of the relative humidity of the air in contact with them. In order to control the relative humidity, the temperature of the air must be controlled; this temperature control also brings its own independent advantages. Equilibrium relative humidities and moisture content of some Hard Winter wheat stocks are shown in Table I.

TABLE I

R. H.	*Per Cent. Moisture in Stock.*				
Per Cent.	*Wheat.*	*1st Break.*	*Sizings.*	*Flour.*	*Bran.*
50	12·00	11·85	11·65	12·00	11·75
55	12·85	12·75	12·60	12·90	12·60
60	13·75	13·65	13·60	13·70	13·65
65	14·70	14·65	14·60	14·50	14·70
70	15·60	15·75	15·60	15·35	15·70
75	16·50	17·10	16·75	16·15	16·75

North-western Miller—Dr. C. O. Swanson.

It will be noted from the table that flour with the desirable moisture content of 13·7 per cent. moisture has an equilibrium relative humidity of 60 per cent. and this with wheat entering the mill at about the same moisture content.

Allowance must, however, be made for a certain amount of evaporation, so it is usual to bring the stock in at the moisture content most favourable for the final one desired in the flour, say in the order of 15·7 per cent. instead of 13·7 per cent. Closely connected with the relative humidity is temperature—an ideal temperature for the mill would be about 78° F. all the year round. This applies mainly to the roller floor, and may be allowed to vary somewhat on the other floors.

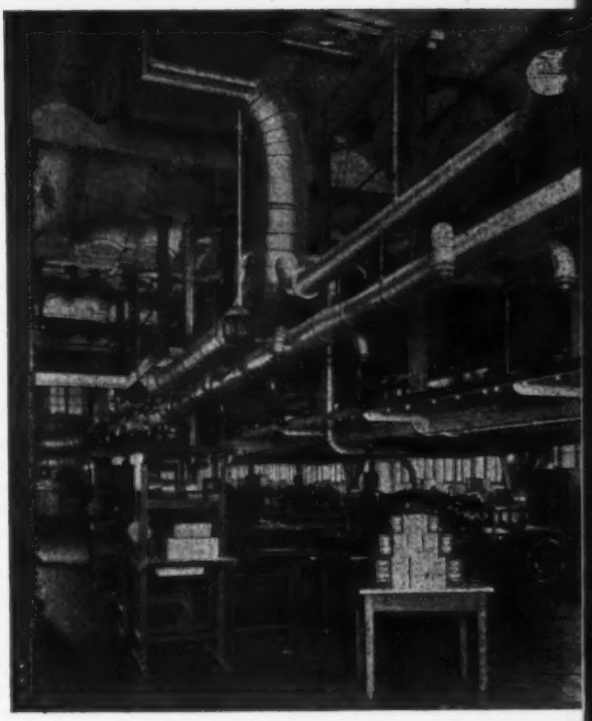


Fig. 5.—The upper floor of a sugar packeting department serviced by air conditioning equipment.

The Bakery

The bakery provides scope for all-the-year-round conditioning plant, one that is fully equipped, cooling the air as well as controlling the moisture content.

The operations of dough mixing, fermentation, proofing and bread cooling all need constant conditions of temperature and humidity. The fermentation room should be maintained at a temperature of 78° F. Very few bakeries have the atmosphere of the make-up department conditioned; in this department it is desirable, however, that 80° F. and 60 to 70 per cent. relative humidity be maintained. Proofing should take place at 95° F. and a relative humidity of 85 per cent. The bread cooling tunnel should be maintained at from 75° F. to 80° F. and approximately 85 per cent. relative humidity. If the bread is wrapped the operation is usually carried out in a room conditioned to 70° F. to 80° F. and 50 per cent. to 70 per cent. relative humidity.

It has been found from experience that flour should be stored in an air conditioned room in order to maintain its normal moisture content and preserve its quality; the conditions required in the room are 78° F. and 70 per cent. to 75 per cent. relative humidity. Fig. 2 illustrates the ductwork installed in a large bakery for the distribution of conditioned air.

The Bacon Factory

Bacon calls for fully air conditioned plant in the different stages of manufacture. Fig. 3 is a view of a hanging-hall in a large bacon factory equipped with an air conditioning plant.

Air conditioning is used in the chill-room, curing-room, pluck-room and feet-curing room.

Before the carcase of the pig enters the cutting-room rapid chilling is necessary to stop bacterial action, and the temperature of the cutting-room is maintained at approximately 40° F. to 45° F., with a relative humidity of about 65 per cent.

The pickling operation is carried out at about 36° F. and the relative humidity of the air is controlled in order to prevent the interchange of moisture between vats and surrounding air. Unless the vapour pressure of the air is controlled the salt solution would act as an absorber, tending to alter the concentration of salt. The recommended relative humidity is 15 per cent.

The soaking-room, where the next step of the process is carried out, needs conditioned air in order that condensation and subsequent bacterial contamination may be obviated; the temperature of the air should be approximately 108° F., with a relative humidity of 47 per cent.

The pluck-room is maintained at a temperature which will cool the offal and plucks—a temperature of 30° F. —while in the feet-curing room the air is conditioned to cool the feet to 43° F.

Sliced bacon production is a process in which air conditioning is useful, because in the process of preparation a temperature of 27° F. to 30° F. is necessary to harden the bacon, while to avoid possible cantamination filtered air at a temperature of 28° F., with the relative humidity controlled to avoid moisture deposit on the meat, should be provided in the cutting-room.

Bacon production is but one of the sections of the meat industry wherein air conditioning is of prime importance.

In meat canning and the elaboration of its by-products the many processes, involving hanging, boning, trimming, cutting, curing, mincing, etc., the materials are in contact with air for a considerable period of time.

To give one example, temperature and humidity control in the hanging-room is important, the latter to avoid on the one hand excessive loss of weight due to evaporation and on the other condensation of moisture on the surface of the meat. Similar considerations apply to many of the other departments.

Air conditioning is of vital importance in the preparation of dairy products, while chocolate and confectionery manufacture is only successfully carried out if the atmospheric conditions are correct.

Difficulties are encountered in the handling of sugar if the atmosphere is not controlled, due to the absorption of moisture and the consequent caking of the sugar; this is prevented by the supply of conditioned air, which ensures a free-flowing product. Fig. 5 illustrates the upper packing floor of a sugar packeting department serviced by air conditioning equipment.

The manufacture of lard substitutes is assisted if conditioned air is supplied in the roll-room to prevent the deposit of moisture on the rolls. In this industry conditioned air is also needed in the packing- and ageing-rooms.

The supply of conditioned air to food-packing rooms assists in the labelling of food containers, suitable atmospheric conditions ensuring that the labels adhere to the containers.

Direct air cooling alone is used for many purposes. One of its most important applications at the present moment is in the canning industry. Fig. 4 illustrates a cooling plant installed in a canning factory. This is carried out after sterilisation, and before the products are placed into storage.

(To be continued)

Photos by courtesy of Messrs. Davidson and Co., Ltd.

A Kitchen Model Dehydrator

A KITCHEN model dehydrator has recently been developed by research staffs of the Tennessee Valley Authority and the University of Tennessee to aid America's food programme by enabling owners of small gardens to preserve their products.

Built with easily available materials, the dehydrator has a capacity of ten to twenty-five pounds of fruits or vegetables. Heat is supplied by five 200-watt electric lamps, while an ordinary household fan circulates the air among the glass trays. The fan and the frame holding the lights may be removed and the cabinet used for sulphuring of fruits, to maintain colour and quality by burning a sulphur candle or loose sulphur in a container beneath the trays.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Gustation

PART II

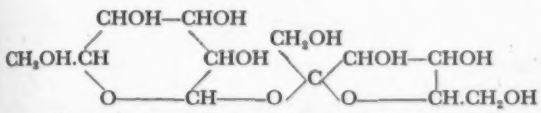
R. W. MONCRIEFF, B.Sc., A.R.I.C.

The Sweet Stimulus

WHEREAS the sour taste is produced by a well-defined class of similar substances, the acids, and the saline taste by the salts, the sweet taste is produced by a variety of organic compounds which as a rule are not ionised. The sweet taste is a later development than the salt and sour and is concerned with nutrition. Perhaps the sweet substances most commonly met are sugar, glycerine and saccharin. The first two of these have certain resemblances—they are both polyhydric alcohols with the following formulæ :

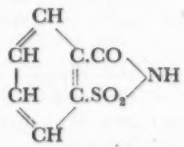
$CH_2OH.CHOH.CH_2OH.$

Glycerol.



Sugar (sucrose) is glucose fructoside or fructose glucoside.

The repetition of the $-CH_2OH$ group will be noted, and is indeed significant, but, if we now consider saccharin, it is quite different :



Saccharin (*o*-sulphobenzimide).

It will be seen that it contains the aromatic benzene nucleus, yet often this same nucleus imparts a bitter taste, for whilst

Glycol $CH_2OH.CH_2OH$ is sweet,
Styrol $C_6H_5.CHOH.CH_2OH$ is bitter.

Many naturally occurring glucosides are bitter, and these frequently contain the benzene nucleus, but on removal of the nucleus by hydrolysis give the sweet sugar.

While the sugars are absorbed by the body and form a valuable food, yet saccharin passes through the body unchanged.

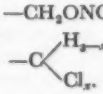
Other stimuli for sweet taste are lead acetate (sugar of lead) and the salts of beryllium (glucinum). In the latter case the sweet taste is shared by different salts of beryllium, all of which are ionised, and it is the Be^{++} ion which is responsible for the sweet taste. It is said that extremely dilute solutions of caustic soda and caustic potash taste sweetish.[26] α-Amino-acids are a group of organic substances with a sweetish taste. Cohn, in his book *Die organischen Geschmacksstoffe*, drew certain conclusions as to sweetness. He noted, for example, that a multiplicity of hydroxyl groups gave sweetness, and these and α-amino-acid groups and such-like he termed " sapophoric " groups, and noticed that they frequently occurred in pairs. Cohn also pointed out that many substances had an after-taste. Saccharin, although intensely sweet, has a noticeable and persistent bitter after-taste. Oertly and Myers[27] took Cohn's work further. Considerable success had at this time been achieved by de Witt's theory of dyeing. This postulated the necessity of two different kinds of group in the same molecule to form a dyestuff, a chromophore and an auxochrome. By analogy Oertly and Myers postulated that to be sweet a substance must contain a " glucophore " and an " auxogluc." The significance of Cohn's observation that his sapophoric groups very frequently occurred in pairs will now be seen. Six glucophores were pointed out by Oertly and Myers—viz. :

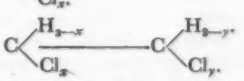
(1) $-CO-CHOH-(H)$. The group $-CO-CHOH-$ must be combined with at least one hydrogen atom to become a glucophore.

(2) $CH_2OH.CHOH-$.

(3) $COOH.CHNH_2-$.

(4) $-CH_2ONO_2$.

(5) 

(6) 

Where Cl stands for any halogen.

The nine auxoglucs found were : (1) $H-$, (2) CH_3-, (3) C_2H_5-, (4) $CH_3CH_2CH_2-$, (5) $(CH_3)_2CH_2-$, (6) CH_2OH-, (7) CH_3CHOH-, (8) $CH_2OH.CH-$, (9) $C_nH_{2n+1}O_n-$ of normal polyhydric alcohols, the simplest of which is CH_2OH-.

In order to have a sweet taste a substance must contain a glucophore and an auxogluc. Typical cases were :

	Glucophore.	*Auxogluc.*
Glycol	$CH_2OH-CHOH-$	$H-$
Glycerol	$CH_2OH-CHOH-$	CH_2OH-
Glucose	$-CO-CHOH-$	CH_2OH-
Glycine	$COOH.CHNH_2-$	$H-$
Chloroform ...	$-CCl_3$	$H-$
Ethyl nitrate ...	$-CHONO_2$	CH_3-

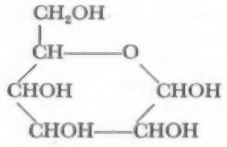
While this theory brings some order into the mass of empirical knowledge, it is not comprehensive and must be regarded only as a beginning. It makes no explanation of the sweetness of saccharin or of dulcin *p*-$HO.C_6H_4.NHCONH_2$.

Sucrose $C_{12}H_{22}O_{11}$ obtained from the sugar cane average content 13 per cent., or the sugar beet average content 16 per cent., is the natural sweetening agent. On treatment with certain enzymes or with dilute acids it is hydrolysed.

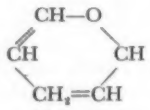
$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

Sucrose. — Glucose or dextrose. — Fructose or lævulose.

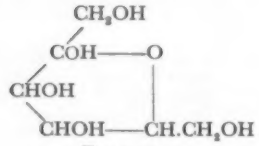
Now, sucrose is dextro-rotatory to polarised light, while dextrose is also dextro-rotatory, but levulose is lævo-rotatory, and, as it is more strongly so than dextrose is dextro-rotatory, the mixture of glucose and fructose obtained from sucrose is lævo-rotatory, whilst the original sucrose was dextro-rotatory. Accordingly, sugar is said to be "inverted" on hydrolysis, and the resultant mixture is "invert sugar," whilst the enzyme causing the hydrolysis is *invertase*. The structure of glucose and fructose is interesting, for the former has a six-atom ring and is a derivative of pyrane, whilst fructose probably has a five-atom ring and is a derivative of furan.



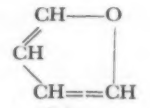
Glucose.



Pyran.



Fructose.



Furan.

There are many sugars, but not all are equally sweet. As long ago as 1906 Becker and Herzog[28] measured the sweetness of some of them and found that the sweetness decreased in the following order: sucrose, levulose, lactose, dextrose, maltose, galactose. In this series lactose and dextrose were about equal.

More recently Biester, Wood and Wahlin[29] have issued a quantitative report. Taking sucrose as the standard with a sweetness of 100 units, other sugars have the following values:

Fructose	173
Glucose	74
Xylose	40
Maltose	32
Rhamnose	32
Galactose	32
Raffinose	23
Lactose	16

These values are for equal weights. Now, the molecular weights of sucrose $C_{12}H_{22}O_{11}$, glucose $C_6H_{12}O_6$ and fructose $C_6H_{12}O_6$ are respectively 342, 180 and 180, so on hydrolysis

$$1 \text{ kilo sucrose} \longrightarrow \frac{180}{342} \text{ kilo glucose} + \frac{180}{342} \text{ kilo fructose}$$

and, taking the respective sweetness values from the above table, we have:

Sucrose. (*Sweet units.*)		*Glucose.* (*Sweet Units.*)		*Fructose.* (*Sweet Units.*)
100	⟶	$\frac{180}{342} \times 74$	+	$\frac{180}{342} \times 173$
or 100	⟶	39	+	91
or 100	⟶	130		

This increase in sweetness on the inversion of sucrose actually takes place and Biester, Wood and Wahlin measured the sweetness of invert sugar to be 127·4.

Willaman[30] confirmed that the sweetness of levulose was 173 compared with sucrose 100. This figure agreed with that given above and was determined by measuring the lowest concentration detectably sweet to a number of subjects. Earlier work which had involved remembering the sweetness of one solution when tasting the next had led to a lower figure of 108, but the later figure of 173 is clearly more reliable.

Renner[31] has pointed out that the relative sweetness of cane sugar, glucose and fructose changes with dilution. He estimated that the sweetness of glucose to cane sugar (100) was 53 at a concentration of 8 per cent., but was 88 at 35 per cent. concentration.

Carr, Beck and Krantz[32] measured the degree of sweetness of various sugars by noting the minimum concentration which would just produce a sweet taste within a half to one minute. In the following table the sweetness is shown together with the number of carbon atoms and hydroxyl groups in the molecule and the molecuiar weight:

	Sweetness.	*Carbon Atoms.*	*OH Groups.*	*Mol. Wt.*
Sucrose	100	12	8	342
Ethylene glycol ...	130	2	2	62
Glycerol	108	3	3	92
dl-erythritol ...	238	4	4	122
Penta-erythritol ...	110	5	4	136
i-arabitol	100	5	5	152
d-mannitol... ...	57	6	6	182
dl-sorbitol	54	6	6	182
i-dulcitol	74	6	6	182
Inositol	50	6	6	180

No relation between the number of carbon atoms, hydroxyl groups or the molecular arrangement or spatial configuration and the sweet taste has been observed in these compounds.

As regards measurement of sweetness, the threshold method has been most used lately, and, as has been indicated, this depends on the minimum concentration of the substance which can just be tasted. The sweetness is the inverse of this concentration, and for convenience the sweetness figures are usually adjusted to sucrose = 100.

Another method which has been used is Pauli's method,[33] and, as this has the advantage of enabling the observer to compare concentrated solutions, it will be briefly described. A standard solution of 2 per cent. sucrose is usually used. Then two solutions of the substance to be tested are prepared, one weaker and one stronger than the standard, and then about seven intermediate strengths differing by equal quantities are made up. The observer makes several tests by tasting the series and noting which is weaker or stronger than the standard, and then the series is turned round and more tests made to ensure freedom from chance. This method has the disadvantage of involving remembering sweetness, but by taking many solutions and using several testers blindfolded it has given good results. Some of these will be given a little later.

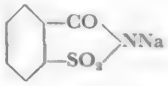
Meanwhile it is necessary to draw attention to the artificial sweeteners saccharin and dulcin at this stage. Whilst sugar is our natural sweetening agent, sac-

charin finds a place in the diet of diabetics who cannot tolerate sugar, and in wartime in the diet of the general population if sugar is scarce. Saccharin was discovered in 1879 by Remsen and Fahlberg in America. They made it by oxidising *o*-toluene sulphonamide :

o-toluene sulphonamide. Saccharin.

Fahlberg noted that his bread tasted sweet when eating his supper, traced the taste to his hands, and, returning to the laboratory, identified the sweet substance there. Pure saccharin is about 700 times as sweet as sugar, but the commercial product may be only half as sweet. It is only soluble with difficulty in water—1 part in 400 parts of boiling water—but the slight solubility at body temperature is sufficient to give the taste sensation.

The sodium salt



is readily soluble and is known as " crystallose." It is similar to saccharin itself in sweetness.

Dulcin or " sucrol " is *p*-ethoxyphenyl urea :

In Germany interest in this product was shown in 1916, and it was stated to be harmless to animals and man and to have no bitter after-taste which saccharin possesses. Its sweetness was given as 200 times that of sucrose, so it is considerably less sweet than saccharin.

Paul[34] used Pauli's method to determine the sweetness of saccharin and dulcin. He found that the sweetness was not constant, but decreased with increasing concentration of the solution. Thus saccharin may vary between 200 and 700 and dulcin between 70 and 350. Paul[35] also observed that the degree of sweetness of saccharin is increased out of all proportion by the addition of dulcin. Normally the sweetness of mixtures was the sum of the sweetness of the components, but saccharin and dulcin gave an anomalously high figure.

Heiduschka and Komm[36] used Pauli's method and determined the sweetness as " degree of sweetness " compared with an equal weight of sucrose taken as unity and also as the molecular degree of sweetness compared with an equimolar solution of sucrose. Some of their results were :

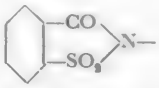
	Degree of Sweetness.	*Molecular Degree of Sweetness.*
Glycine	0·64	0·14
Sarcosine ...	0·62	0·16
dl-alanine ...	0·92	0·24
d-alanine ...	0·73	0·19

Heiduschka, Komm and Simeons,[37] using a similar method, investigated the change in sweetness on dilution. They found that the degree of sweetness increases with decreasing dilution (the sugar solutions, of course, being correspondingly diluted), and that below 5 per cent. there is often a rapid increase. Figures given for two of the amino-acids are :

	Degree of Sweetness.	*Molecular Degree of Sweetness.*
2½% solution glycine ...	1·19	0·26
5% ,, ,, ...	1·03	0·22
7½% ,, ,, ...	0·85	0·18
10% ,, ,, ...	0·77	0·17
15% ,, ,, ...	0·64	0·14
(*cf.* above table)		
20% ,, ,, ...	0·55	0·12
25% ,, ,, ...	0·46	0·10
2½% solution *dl*-alanine	1·70	0·44
5% ,, ,,	1·28	0·33
7½% ,, ,,	1·06	0·27
10% ,, ,,	0·93	0·24

Emil Fischer[38] had shown that many α-amino-acids have a sweet taste.

Täufel and Wagner[39] pointed out that, as saccharin was sweet and its sodium salt which was a strong electrolyte was also sweet, the sweet taste was due to the anion



However, if the dissociation was depressed by the addition of sodium sulphate, sodium acetate, or dilute hydrochloric acid, the sweetness was not affected within experimental error (25 per cent.). Dulcin was found to be a very weak base, and its sweetness was considered to be due to the free molecule. They thought the increase in sweetness on mixing solutions of saccharin and dulcin was due simply to the greater dilution each substance then enjoyed, so behaving with enhanced sweetness, and was not due to any kind of salt formation.

Täufel and Klemm[40] showed that if alcohol was added to aqueous solutions of saccharin it considerably increased the sweetness.

Gilman and Hewlett[41] compared the sweetness of dulcin, saccharin and some furane derivatives with 2 per cent. sucrose solution. The following are amongst the figures they gave :

Sucrose	100 standard
Dulcin	265
Saccharin	675
Furonitrile	100
Furylacrylonitrile	200
Furfuraldoxime	2·5

In a similar connection Gilman and Dickey[42] showed that syn—5-benzyl-2-furfuraldoxime was 700 times sweeter than sugar and slightly sweeter than saccharin.

Oddo and Perotti[43] tried to clear up the point of the anomalously high sweetness of saccharin and dulcin mixtures. Since dulcin is a substituted urea, they tried adding (1) urea, (2) thiourea to saccharin solutions. They obtained similar enhancement of the sweetness, so it appears to be a property of the urea grouping. In addition, urea shared with dulcin the property of masking the bitter after-taste of saccharin, but thiourea increased this disagreeable feature.

Owing to its intense sweetening power, saccharin is often diluted with a less powerful sweetener. Kreidl,[44] for example, suggests the dilution of saccharin with glycine, the resulting powder being useful for spreading over confectionery.

Blanksma and Van der Weyden[45] have described a body:

4-nitro-2-aminophenyl propyl ether

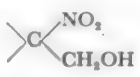
4·2 $O_2N.NH_2C_6H_3OC_3H_7$

which they say is 3,300 times as sweet as 1 per cent. sucrose, and therefore the sweetest substance known. It is about five times as sweet as saccharin.

Some substances have two quite noticeable tastes, sweet at the tip of the tongue and bitter at the back of the mouth. Such a one is "bitter-sweet," and the property is due to a glucoside called dulcamarin found in it. Similarly, certain salts like Epsom salts are simultaneously salt at the tip and bitter at the back of the tongue.

The Bitter Stimulus

Like the sweet taste and unlike the salt and sour, the bitter taste is found in a variety of compounds. We have already seen that whereas sodium chloride is typically saline, cæsium chloride is bitter, and that iodides—*e.g.*, potassium iodide—are often bitter. As the molecular weight increases there is a gradual change in the salts, from saline to bitter taste. Cohn pointed out that a similar relation between sweet and bitter existed for many organic substances, as the lower members of a homologous series will be sweet but the higher members bitter. Magnesium and ammonium salts are often bitter—*e.g.*, magnesium sulphate, which is Epsom salts. The bitter taste is due to the Mg^{++} ion, and it is of interest to remember that magnesium is the next member of the group, of which beryllium (sweet salts) is the first member. Calcium, the next member of the same group, also gives bitter salts. Other well-known bitter substances are picric acid (πικρός, bitter) and the alkaloids. In picric acid the bitter taste overwhelms the sour taste. Picric acid contains three $-NO_2$ groups, and it seems to be established that the presence of three such groups in a molecule confers the bitter taste, whilst two may do so. Henry[46] showed that bitterness was frequently associated with the group:



As an example of the change from sweet to bitter on ascending a homologous series we may take the betaines of amino-acids. Kuhn and Giral[47] showed that whereas valerobetaine and caprobetaine had transient sweet tastes, the betaine of amino-pentadecylic acid was bitter. One outstanding feature of the bitter taste is that it is so much more sensitive than the others.

Parker and Stabler[48] showed that quinine hydrochloride $C_{20}H_{24}O_2N_2.HCl.2H_2O$ could be tasted in a solution as dilute as 0·00004 molar—*i.e.*, 0·0016 per cent.—so that if 5 c.c. is used as the test portion this only contains 0·00008 gm.

Scholl and Munch[49] gave comparative figures for the bitterness of different substances as follows:

Brucine ...	...	1,000-1,250 (dimethoxystrychnine)
Strychnine	...	320
Quinine ...	...	100
Aloin ...	...	33
Theobromine	...	5

Gertz[50] has reported that the minimum detectable concentrations of caffeine and theobromine are respectively 0·006 per cent. and 0·004 per cent. From this estimate, and taking into account the comparative figures for bitterness of quinine and theobromine, one would expect the threshold value of quinine hydrochloride to be 0·004 per cent. × 5/100, or 0·0002 per cent., which is about twelve times more dilute than the threshold concentration of 0·0016 per cent. determined by Parker and Stabler. Such discrepancies are frequently found and are to be expected in determinations where the personal equation enters so strongly.

Minimum Stimuli

The threshold values for the four tastes have mostly been given already, but are grouped here for comparison:

Sour taste is detectable in N/800 HCl or 0·0045 per cent. HCl.

Salt taste is detectable in 0·055 per cent. NaCl.

Sweet taste is detectable in 0·7 per cent. sucrose or about 0·001 per cent. saccharin.

Bitter taste is detectable in 0·0001 per cent. brucine.

These figures are conservative. For example, Gley and Richet[51] reported that strychnine hydrochloride could be tasted in 0·00006 per cent. solution. In any case, the bitter taste of strychnine and brucine is clearly detectable in much greater dilutions than the other tastes.

It may be noted that Howell[52] gives the following as the threshold values:

Sour	0·007	per cent.	HCl
Salt	0·25	,, ,,	NaCl
Sweet	0·50	,, ,,	sugar
Bitter	0·00005	,, ,,	quinine

His figure for the bitter taste agrees well with Gley and Richet's early figure; the salt taste is high, in view of Richter's recent work; whilst the sour and sweet threshold figures agree well with the most recent determinations.

If the sweet stimulus used is sugar, the order of sensitivity (highest first) is, in each case: bitter, sour, salt, sweet. But if the new synthetic sweeteners like saccharin are included—and there is no reason why they should not be—then the order is: bitter, sweet, sour, salt.

Barysheva[53] pointed out that fluctuations in the threshold of the taste sensation can occur in anyone, owing to various factors acting on the nervous system. Sensitivity may be enhanced or depressed. With repeated practice a very keen sensitivity can be developed, probably because of the fixation of attention on these sensations. Taking into account not only the differences between individuals, but also the temporary differences in one individual, it is not surprising that discrepancies are found when comparing threshold values.

For many years now it has been conceded generally that there are four primary tastes. It has been claimed that it is possible to make any known taste by suitable mixtures of sweet, salt, sour and bitter

substances. For example, von Skramlik[84] indicated that tastes could be imitated by mixtures of sodium chloride, quinine, tartaric acid and glucose. Most mixtures had three of the four primary tastes as constituents. Baryscheva[85] also claimed that the taste of any substance may be imitated by using mixtures of solutions of sodium chloride, sucrose, oxalic acid and quinine hydrochloride. The most striking confirmation of the existence of four primary tastes has come from Allen and Weinberg,[86] who found four critical frequencies of gustation for each electrical stimulus and were able to link these four frequencies up with the four primary tastes in ways to be described.

Many tastes will occur to the reader which are not readily assigned to any one of the four groups. Meat, for example, the taste of which is also found in glutamic acid salts, is not noticeably sweet, sour, salt or bitter. In fact, most of its "taste" is odour, and anosmic people cannot distinguish between meats by taste.

The alkalis caustic soda, caustic potash and sodium carbonate have a distinctive taste, sometimes thought to be due to the hydroxyl ion. Such substances can be detected in solutions as dilute as 0·01 per cent. It has been suggested that the alkaline taste is a complex of other tastes and touch and also that it is due to the alkalis acting chemically on the tongue and producing odorous substances. Neither of these suggestions is very convincing, as our experience tells us that alkalis have a distinctive taste. The writer suggests that the alkaline "taste" is a modality not of taste, but of the common chemical sense, and it may be noted that alkalis are chemically irritating to other parts of the body as well as the tongue. It would be interesting to compare the threshold values of alkaline solutions on the centre of the dorsal surface of the tongue and on the inside surfaces of the cheeks, where there are no taste buds in adults, with the threshold value on the tip of the tongue, which is plentifully supplied with taste buds.

Borax, again, has an astringent taste not easy to place as sour, sweet, saline or bitter.

A "metallic" taste is excited by solutions of salts of the heavy metals such as silver and mercury. It is stated that silver nitrate can be detected at 0·003 per cent. and mercuric chloride at similar concentrations. The taste is ascribed to the Ag^+ and Hg^{++} ions, but here again it has been ascribed variously to a mixture of other tastes and to olfaction.

Distilled water has an unusual taste, due to the lack of carbon dioxide which occurs in most waters. True insipidity is not necessarily associated with distilled water. The saliva is the liquid standard by which we judge all other tastes, and that has not been distilled. Distilled water has a taste like a very dilute solution of alkali.

Hydrogen peroxide has a peculiar taste, and Renqvist[87] considers it to be due to chemical action on the tongue.

Paprika, pepper and ginger have hot tastes, whilst peppermint and menthol have cold tastes, and Stary[88] considers that these tastes are due to stimulation of the heat and cold sensitive spots on the tongue. In any case, such substances as pepper are, in the author's view, clearly irritants of the chemical sense, although pepper and ginger have a sweet taste, which adds to their attractiveness.

It has long been known that the passage of an electric current through the tongue evokes a sour taste, partly on account of electrolysis of the saliva producing H^+ ions and partly due to direct stimulation of the receptors by the electric current, just as the nerves of a frog's leg can be so stimulated. This direct stimulation involves not only the sour receptors, but also the saline, sweet and bitter receptors.

F. Pasteur[89] reported that a metallic taste is developed when a constant current is passed through a subject with the electrodes on the mandible.

Bujas and Chweitzer[90] reported that whilst an alternating electric current applied to the tongue with low frequency and intensity gives a sour taste, if the frequency and intensity are increased, then a bitter taste is evoked.

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(*To be continued*)

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, May 1, page 176.

No.	*Date.* 1944.	PRICE FIXATION ORDERS
164	Feb. 16.	Bacon (Control and Prices) Order. *Revokes* S.R. & O. 1939 Nos. 1199, 1335, 1337, 1444 and 1818; 1940 Nos. 62 and 1833; 1941 Nos. 9, 122, 181, 296, 461, 833, 864 and 1347; and 1942 No. 2147.
217	,, 29.	Order, revoking the Cream (Control) Order, 1940, and the Food (Current Prices) Order, 1941. *Revokes* S.R. & O. 1940 No. 1357 and 1941 Nos. 23, 39, 43, 1053 and 1078.
224	Mar. 4.	Order, amending the Citrus Fruit (Maximum Prices) Order, 1943.
247	,, 8.	Eggs (Control and Prices) (Northern Ireland) Order. *Revokes* S.R. & O. 1941 No 1221; 1942 Nos. 532 and 1086; and 1943 No. 508. S.R. & O. 1941 No. 974 *is also revoked in so far as it relates to Northern Ireland.*
248	,, 8.	Order, amending the Egg Products (Control and Maximum Prices) Order, 1943.
284	,, 16.	Order, amending the Potatoes (1943 Crop) (Control and Prices) (No. 2) Order, 1943.
		FEEDING STUFFS
296	Mar. 18.	Order, amending the Feeding Stuffs (Regulation of Manufacture) Order, 1943.
		FISH
397	Apr. 4.	General Licence, under the Fish (Supplies to Catering Establishments) Order, 1943.
		FOOD STANDARDS
275	Mar. 14.	(Mustard) (No. 2) Order (1943 No. 1553 Reg. 2). *Revokes* S.R. & O. 1944 No. 43.
		FRUIT
87	Jan. 26.	Fresh Fruit, Vegetables and Flowers (Use of Containers) Order. *Revokes* S.R. & O. 1943 No. 632.
135	Feb. 8.	Canned Fruit and Vegetables Order. *Revokes* S.R. & O. 1943 Nos. 144, 236, 901 and 1087.
		JAM AND MARMALADE
174	Feb. 21.	Imported Canned Marmalade (Prohibition of Retail Sales) Order.
455	Apr. 18.	Order. Order 455 (Rationing).

No.	*Date.* 1944.	MILK
417	Apr. 7.	Directions, supplementary to the Milk (Control of Supplies) Order, 1942, and the Milk (Control of Supplies) (Scotland) Order, 1942. *Revokes* S.R. & O. 1943 No. 1566.
		POINTS RATIONING
115	Feb. 2.	Order, amending the Food (Points Rationing) (No. 3) Order, 1943. (Canned Peas and Canned Fruit.)
362	Mar. 28.	Order, amending the Food (Points Rationing) (No. 3) Order, 1943.
		POTATOES
468	Apr. 20.	Potatoes (General Provisions) Order.
469	,, 21.	New Potatoes (1944 Crop) Order.
		RATIONING
202	Feb. 24.	Order, amending the Food Rationing (General Provisions) Order, 1943, the Fats, Cheese, Sugar and Tea (Rationing) Order, 1943, and the Sugar and Preserves (Rationing) Order, 1943.
		RETAIL PRICES
167	Feb. 17.	Retail Prices (Notices) Order. *Revokes* S.R. & O. 1942 Nos. 494, 831 and 1396.
		SOFT DRINKS
209	Feb. 29.	Order, amending the Soft Drinks Order, 1943.
		STARCH
297	Mar. 18.	Starch Food Powders (Control) Order. *Revokes* S.R. & O. 1941 No. 1742.
		SUGAR AND PRESERVES
363	Mar. 29.	Sugar and Preserves (Rationing) Order. *Revokes* S.R. & O. 1943 No. 1597.
412	Apr. 6.	General Licence, under the Food Rationing Orders, 1943.
		TRANSPORT
473	Apr. 20.	Order, amending the Food (Sector Scheme) Order, 1943.
		VEGETABLES
87		Use of Containers. *See Fruit.*
135		Canned Fruit and Vegetables. *See Fruit.*

Good Type Baconers in the Making. *"Farmer and Stockbreeder" Photo.*

Pig Farming and Bacon Production

COLLAN E. BRETT.

VARIOUS agricultural organisations are apparently alive to the urgency of planning for the future, as they are at this moment devoting much energy to discussing the subject, but there would appear to be much ground to cover before a comprehensive scheme can be formulated.

Indeed, it is questionable as to whether the subject is being approached from the right angle in at least one vital respect.

Promoting Consumer Goodwill

The measure of agriculture is the service it gives to the consumer, and this is enhanced in many ways by the research worker and the food manufacturer. Its success, therefore, will, when we return to the freedom expected of peace, be dependent not only on its ability to sustain the health of the populace, but also on the industry's diligence in paying attention to the finer point of consumer taste, especially if agriculture is to command the utmost public goodwill. The point could not be dealt with to best advantage by the Government or a Ministry, and, unless the ultimate consumer sets up his own organisations to watch and advise on his particular interests, the food manufacturer is surely the best qualified to represent them to the primary producer. And he will do well to take heed.

The Current Attitude of Agriculture

Though it is questionable as to how much, in a general way, the views of the executives of most of the agricultural organisations, or those of their members, reflect those of the average practical farmer, to many who have a strong sympathy with agriculture and want to see it make its fullest contribution, not only to its own success and stability but to world peace and contentment, it is disquieting to note from contacts with them that the consumer's point of view does not appear to concern them as much as, in the farmer's interests, it should. Of course, they are themselves consumers, and could not but be biased. They should therefore show more definitely than in the past that so far as nature, science and economy will allow them to do so they are "out" to meet the consumer's most exacting demands. Then all concerned with production and distribution should co-operate in a spirit of mutual goodwill and try to satisfy those demands.

Theory Versus Practice

Again, some experts who give public advice to farmers are so purely academic in outlook that they are capable of overlooking altogether the real purpose of farming—namely, to produce by the application of science to nature not merely food, but of a quantity and kind to satisfy the consumer. They appear to advise the farmer to approach the problem with the question "What have I to sell?" rather than "What can I sell?"

An instance of this occurred in a recent broadcast discussion entitled "Pigs on the Farm," when the opinion was expressed "that the future of the [pig] industry in this country lay . . . with the general

mixed farmer—a few pigs on every farm." Though, as will be shown, it takes little account of the consumer's needs, not only as regards quantity, but also quality, admittedly such a policy might be used to help farmers maintain a " balanced farm economy " so far as it is practicable on individual farms, ensuring soil fertility and, to a modest extent, financial soundness. Be that as it may, the progressive farmer will recognise that in the long run prosperity cannot remain the prerogative of the few, but, to be stable, must come to all, and he will therefore exercise his mind and body not only to maintain soil fertility and a secure position for himself, but by the application of scientific knowledge to use the resources of his farm, working capital and personal aptitude to best purpose to ensure maximum service to the consumer and a high standard of living for his employees and himself.

More and Better Pigs

In regard to pigs, it has been amply illustrated that there is no reason why the farmer should not produce them successfully on a much larger scale than other stock, and, indeed, as far as economy of labour and buying and selling costs are concerned, it is preferable to produce many rather than a few.

As to disease, the experience of the well-managed large piggeries must compare very well with that of the small mixed farms.

Control of quality as influenced both by breeding and feeding methods is also much more practicable than when pigs are kept only in sufficient numbers to eke an existence from the surpluses and by-products of a " balanced farm economy."

At this point it might not be irrelevant to suggest that in the matter of agricultural planning the Bacon Development Board should now be showing more definite evidence of its competence to fulfil its purpose, and that, in doing so, it might stress the importance of the consumer's point of view instead of leaving it to the curer, of whose opinion the farmer is so often, perhaps rather naturally, inclined to be suspicious.

In comparison with the opinion advocating " a few pigs on every farm," a more progressive attitude is displayed by the Pigs Marketing Board, many members of which have had considerable experience as large-scale pig producers. In its report for 1943 it is stated that " the Board considers that, to further the Prime Minister's policy of providing food and work, maximum pig production on all farms should be encouraged, and feels strongly that, while the maximum amount of grain should be grown in this country, it would be in the national interest to import, under control, whole grain for pig feeding in preference to importing bacon, with the objects of conserving exchange, creating employment in shipping and milling industries as well as in the pig- and bacon-producing industries and, in addition, assisting the maintenance of the fertility of the country's arable and dairy lands."

Soil Fertility

As far as soil fertility is concerned, the fattening of pigs with imported grain or its offals can be successfully undertaken on almost any type of farm, and on a scale which need have little or no relation to the size of the holding. There may conceivably be over-production of manure if the farm is virtually a pig " factory " operated on intensive lines, but even then the manure can usually be traded for bedding on favourable terms so that arable land elsewhere can reap the benefit.

Meanwhile, if breeding as well as fattening is practised on the farm, the breeding stock, usually fed out of doors, will also help soil fertility, and here their numbers (*i.e.*, of breeding stock) can be kept within the limits that might have been considered to be desirable from the standpoint of a " balanced " system.

Imports and Exports

It is assumed that grain from abroad will be forthcoming. And this would fit in very well with any need to export coal and iron and, better still, machinery. It will necessitate much hard and thoughtful work by the politicians if such ideal exchange is to be arranged on a sound basis.

Here it might be mentioned as a point of interest that, strange as it may seem, much of the plant used in bacon factories has heretofore been imported, mostly from the countries supplying us with bacon! Preparations are being made to remedy this, and they should be amply justified, as, besides the need for making good the damage due to inadequate maintenance of plant owing to the war, even before extending the country's present curing capacity, much of it, if it is to be efficient, should be remodelled.

And what tremendous scope there is bound to be for extending pig production beyond all pre-war limits! Not to mention fresh pork, we were importing roughly four-fifths of the bacon consumed. In the course of time improved standards of living might well increase the demand, and some authorities, believing that the pig, being so prolific and giving a quicker and more economical turnover than other farm animals, is best suited for the speedy restoration of the world's meat resources, contend that its greater production should be specially encouraged.

It is therefore no time to advise a policy of restriction except as determined by such factors as accommodation available for fattening and again for curing.

Quality Pays

Now as to quality. The points the consumer takes into account directly or indirectly make breeding and feeding on controlled scientific lines essential to successful production, as by no other means can standards and uniformity be attained.

In the past Governments appeared to have had more regard for foreign trade than for the position of home agriculture, and farmers contend that this was the major cause of the periods of depression the industry has experienced. But be that as it may, towards the end of the last century, as this country was developing curing as an industry, our farmers practised the " few pigs on every farm " policy and paid little or no attention to the question of carcase weight and conformation; this while the purchasing power of the worker was increasing and his taste becoming more discerning and delicate.

We had the best breeding stock with which to meet the consumer's demands, but we left it to other countries, mostly to Denmark, to show us, as with other farm produce, and with the aid of basic breeding stock from this country, how to mass-produce and supply

our market with quality foods of a uniformity which gained and held the confidence of the consumer without a break. As a result, in spite of their vaster quantities, these imported goods at times commanded even better prices than the pick of the home produce. The latter—that is, the best of them—might have been of superior quality, but the general supply had not conformed to any definite standards until competition of the imported article was so great as to compel it if the home industry was to survive at all. The imported article had by then established its standards to an extent that a purchaser could buy it almost literally "with his eyes shut," without fear of disappointment, so that it almost completely captured the home market and price became virtually of secondary importance.

About ten years ago (after farmers had gone through a troublous period in which some, having blamed the curers for their misfortunes as far as bacon pigs were concerned, set up their own bacon factories, which in most cases promptly went bankrupt) the Pigs and Bacon Marketing Schemes had begun to show results, and both the pig and bacon industries were getting down to business on sounder lines. But we had still a long way to go before war came, when quality and taste had to give way to mere economy of production. That was the only course as a wartime measure, and on the whole it has worked well.

But some think that because of that much the same marketing systems should function as satisfactorily when we return to normal conditions. But the consumer is more likely then to insist once again on setting his own standards of quality and quantity and on having them recognised. And if attempts are made to overlook him and, to suit an easy system of farming, inferior meat is offered him, we may expect home farming to decline again.

Wishful Thinking

The question is asked: "Would the British public demand the same young lean bacon after the war as they had done before?" This is in the nature of wishful thinking, as if the public would conveniently accept older and perhaps fatter and certainly coarser bacon, its production would fit in well with the simple principle of a "few pigs on every farm." He who is ready to believe in such convenient possibilities must be afraid of progress, and there will be no room for that type of farmer after the war, especially with the return of the farming enthusiasts at present with the Forces. There is, of course, always the possibility of a gradual change in consumer taste, for which farmers would do well to watch, but a change of the nature suggested would be surprising indeed.

The Breeder's Contribution

The expert who would have us return to the haphazard method of small-scale pig production, embraced by the kind of "balanced farm economy" he believes in, will argue that the quality standards recognised immediately before the war were having a serious effect on animal constitution, and he will also emphasise the disease bogey! These are not new problems, and, indeed, must always have serious attention. In seeking, by influencing nature, what might be termed, at least by the consumer, further refinements the farmer must necessarily be conservative, but he would not succeed if he attempted to put the clock back and disregard the benefits of the march of science. In this we have come a long way from the wild boar to the modern pig, but necessarily in very slow stages. The point is we have progressed more or less in the direction ordained by man. Imagine the origin of the cow and of poultry as compared with our modern conception! Or put it this way: we can at least do as well as, with our greater natural advantages, perhaps even better than did the Danes.

So the breeder also must be ready to play his part in meeting the public's demand, and, as one trade journal put it recently, he "has got to change his old policy of breeding regardless of the style of meat wanted." The consumer cannot believe that we in this country are unable to breed types of meat animals to yield carcases to compare with those imported from so many sources for so long a period and he will not take any excuse from the farmer if he fails to provide the style of meat which so obviously can be produced. It is therefore to be hoped that the breeder will not be put off by those who, though apparently sincere in their desire to serve agriculture, in their writings or utterances imply criticism in authoritative tones on matters of considerable concern to the consumer or to industries catering for him, but in which their own experience is of little or no consequence. Two recent examples involving pig breeding concerned a condition known as "seedy cut," which renders useless for bacon a substantial part of the carcase and prejudices the sale of the remainder and appears to come entirely from strains or crosses of the "Large Black" or other coloured breeds of pigs.

In one case, a correspondent, writing in one of the agricultural weeklies and apparently interested in the "Large Black" breed, described it as merely "an issue beloved of bacon curers," but, though later it transpired that he had examined samples and agreed it caused wastage, it was obvious that he had had no experience by which he was justified in making such implied criticism of the curer's opinion.

The other case was somewhat more serious as it concerned a broadcast statement made by an accepted authority on agriculture. He said he believed "seedy cut" to be "largely a curer's prejudice," but on being shown a sample of meat so badly affected as to be unmarketable (at least, as fresh meat or bacon) admitted, in correspondence that ensued, that it was unsightly and he regretted to learn that it was on the increase. But unfortunately, so far as is known, though the opportunity has been open to him, he has not yet taken steps to correct the harmful impression given over the wireless—this when agriculture is wondering how to hold the home market when rationing ceases!

Some believe that by using only pedigree boars of the white breeds the defect could be prevented, or that a more certain safeguard is to use only pure white pedigree breeding stock on both sides, though this is not necessarily advocated as a general practice.

Such prejudice as is behind those dangerous statements must be removed by research and education. How easily the particular fault referred to can be well-nigh banished was illustrated by the pre-war "contract" system of marketing pigs in which the application of a small penalty for it had that effect. Obviously, then, producers know some of the ways by which it can be prevented. In wartime, in view of the wastage, "seedy cut" is still less desirable, but, though a case might be made to justify a little of it, presum-

ably as there is now no penalty for it, it has made its reappearance on a scale reminiscent of the pre-" contract " days.

Boar Licensing

This fault (*i.e.*, " seedy cut "), and other indications of defective breeding, suggest that some breeders have not been as diligent as, taking a long-term view, they ought to have been in wartime no less than in peacetime. But, though it will take time to make good the harm done, the licensing of boars recently proposed by the Ministry of Agriculture (especially if only pure-bred white boars are to be permitted) should have a very good influence. A similar scheme in another country was astonishingly successful in its effect.

The wartime pig *feeder*, however, having little choice in the matter of feeding-stuffs, has only been able to exercise control over carcase quality to a very limited extent.

A Lesson from Canada

Meanwhile, Canada has been supplying us with probably over three-quarters of the bacon ration and has been able to keep fairly close to the 1939 quality standards, with the result that Canadian is very much preferred to the present home product. That fact should not only further convince the farmer as to what are the quality standards favoured by the consumer, but it is also another clear indication that his (the farmer's) success in the future will depend largely on his ability and willingness to satisfy such consumer preferences. Though obviously, in this matter of carcase quality control, he has been more or less powerless during the war, it must have a foremost place in his mind as he plans for the future, and retain his constant attention when, once again, he regains the power to cater for it. Otherwise, any goodwill, built up with the consumer as a result of the farmer's contribution to the war effort, will not stand the test of time.

On the other hand, if the farmer co-operated with the manufacturer, both employing up-to-date scientific knowledge to serve the consumer, his (the consumer's) reaction would in itself provide the most effective influence on Parliament with which no Government could afford to trifle. Many Members of Parliament are now, we are told, turning their attention to the agricultural industry, but no mere sentiment is likely to induce them to favour it at the expense of other essential industries, especially as they know they must sooner or later answer to the electorate in a more definite sense than ever before.

Negative Propaganda

Claims, such as one hears to-day, that the home-produced article is richer in vitamins than the imported one will, without more tangible evidence of the farmer's consideration of the consumer, have an effect opposite to that intended. These claims may be justified, but the farmer should realise that, while as regards vitamins generally the dietetian's view might be acceptable, as regards eye appeal and palatability it cannot be as trustworthy a barometer as popular demand. So it will be time to talk on those lines when our bacon, beef, mutton and so on are consistently of such high visible quality as were those provided pre-war by the more business-like farmers abroad, who will no doubt be anxious to resume trade with us when it is practicable to do so. No, the consumer will not be ready to buy a " pig in a poke " unless he is first convinced by the " poke's " outside appearance that there is definitely something in it that he wants! He will demand more than mere lip-service and, while he is unlikely to favour any policy that would inflate the cost of his food to benefit home producers or manufacturers, or which was to provide subsidies at his expense, he can be relied upon to show in time due appreciation of real service.

The Ultimate Goal

Schemes are now being proposed which are designed to offer agriculture complete financial security and protection from all possible competition. Even if such Utopian conditions were in the best interests of agriculture, they assume we shall retain our old world-wide influence on trade. But we must come to realise that this country cannot for its own purpose monopolise progress, which, in spite of comparatively insignificant attempts to arrest it, will rush on with ever-increasing velocity, spreading throughout the world far and wide.

At this vital phase of national planning we must insist on the interdependence of all our essential industries and keep in mind that, if we are to preserve our own prosperity and peace, we must do nothing to hinder that of other nations, but rather endeavour to trade in a spirit of co-operation and reciprocation, expecting no preference of the home or overseas buyer except as justified by good service and superior craftsmanship, which alone should determine the standard of living. We cannot in future expect world peace while we as a nation wage economic warfare to suit our own ends.

So the farmer must be " up and doing," ready to work shoulder to shoulder with the research worker and the manufacturer in exploring every avenue by which with his produce they can render service. Let him go forward intent on living up to such a slogan as " More and better pigs," rather than to one which in effect is " Fewer and worse pigs." Let him with the rest of the community look with broadened vision for a " balanced economy," not only for his farm, but the nation, and hope that in time to come, through the common effort, such a blessed state will extend and be maintained throughout the whole of the civilised world.

Physical Methods of Analysis

In pursuance of the policy for the formation of Groups for special branches of analytical chemistry, proposed by the Council and approved by a meeting of the Society of Public Analysts and other Analytical Chemists on November 3, 1943, the Council has had under consideration a proposal to form a Group dealing with physical methods of analysis.

The Council's decision as to the formation of the Group will depend on the number of members of the Society desirous of joining it. Members of the Society who wish to become members of the Group are asked to notify the Hon. Secretary of the Society.

Food Consumption in Health and Sickness

SPECIALLY CONTRIBUTED

The importance of Dietary Surveys in supplying information to the authorities responsible for planning nutrition in this country, and indeed throughout the world, has been indicated in a previous article ("Dietary Surveys," FOOD MANUFACTURE, May, 1944). Particular attention was drawn to the influence of economic status on purchases of food, with the main conclusion that although the actual amount spent on food increases with rising income, the proportion of the income spent on food to the total expenditure decreases considerably. The methods commonly used in dietary surveys, and the food habits prevalent in schools, industrial canteens and hospitals, were recently discussed at a further meeting of the Nutrition Society.

THE MOST common procedure in conducting surveys is to make a list of all food eaten over a certain period. With the aid of food tables the items are then entered up in terms of their individual nutrients. To take an actual example: 100 g. of roast lean beef is entered, according to McCance and Widdowson, as 26·8 g. of protein, 12·3 g. of fat and 0·0 g. of carbohydrate, equivalent in all to 224 Calories. Other tables give mineral and vitamin contents. This method has the advantage of saving the tedious labour of repeatedly analysing portions similar to those eaten, but objection may be raised on the question of accuracy. Thus beef may be tender or tough, underdone or overcooked. The table will obviously only give figures correct for average beef. Perhaps the question of cooking is the most important, especially in regard to the highly unstable vitamin C. Fresh cabbage contains an abundance of this vitamin: carefully cooked and served it will still supply our requirement when eaten in reasonable amounts, but bad cooking and "keeping hot" will destroy almost all the vitamin. Such importance has been attached to this particular problem that Dr. Gertrude Wagner, of the Wartime Social Survey, has recently undertaken an extensive investigation into the methods used by housewives throughout the country in cooking vegetables.

The correct assessment of mineral contents is also complicated by extraneous or local factors. Thus surprisingly large amounts of iron may be derived from cooking utensils. McCance and Widdowson found apples cut with a stainless steel knife and cooked in a glass vessel contained only 0·31 mg. of iron per 100 g., but when an ordinary knife and iron vessel were used the value rose to 6·0 mg. per 100 g. The mineral content of the water supply may also be important. Thus in London considerable amounts of calcium may be derived from this source.

Direct Estimations

The uncertainties which arise through the use of food tables have led some investigators to resort to direct analysis of the foods as eaten. If each item of food is analysed separately this procedure is slow even when applied to small numbers of individual subjects, and is obviously impracticable for application in surveys on hundreds of subjects as required by the various official bodies. Although many will agree with Dr. C. P. Stewart in maintaining that food tables, with all their imperfections, are still indispensable in carrying out large-scale surveys, direct analysis has proved useful in one particular type of work. It is often desired to estimate not the individual intake, but the food value of typical meals as supplied in an institution or canteen. It may be recalled that in Macrae's estimations of food intakes in the R.A.F. the airmen were allowed to fill up their plates according to their usual routine and personal tastes, but as they went to their tables men chosen at random had to surrender their whole meal for analysis. After all the specimens taken at meals over a chosen period had been mixed together they were frozen, dried and powdered. Careful analyses were then made at leisure on aliquots. Somewhat similar methods have recently been used by Jenkins, Mapson and Olliver in the analysis of canteen meals in the Cambridge area. To secure satisfactory sampling, specimen meals have been homogenised in a few seconds in a Waring blender. In view of the instability of vitamin C these workers found it advisable to pick out rich sources of this vitamin for separate analysis, and losses were avoided by rapid grinding under a solution of phosphoric acid.

"Man Values"

McCance and Widdowson have also emphasised another difficulty in the interpretation of the results of dietary surveys. It is obvious that a meal which is adequate for a small child will not usually be enough for an adult; and that what suffices for a woman on light domestic duties will not satisfy a coal miner, or some other worker engaged in heavy manual labour. Hitherto such inequalities have been levelled out by the use of tables, which give the approximate requirements of individuals of different ages and sex, and the additional intakes appropriate for labour of different

degrees of severity. Thus Orr and Leitch conclude that a child of one year requires food equivalent to 1,000 Calories, a housewife 2,200 Calories, a man on sedentary labour 3,000 Calories and a smith or coal miner 4,700 Calories.

In estimating whether the total amount of food eaten by a family is adequate for its needs we should, therefore, be able to convert the mixed adult and juvenile members into terms of uniform " man values," based on the requirement of an average man doing average work. Moreover, it might be hoped that " man values " worked out on the basis of Calories would be equally applicable to other nutrients. McCance and Widdowson have discouraged undue optimism in either of these directions. Thus in a group of fourteen-year-old girls they found individual daily food intakes between 1,708 and 3,736 Calories. A Calorie intake suitable for one individual may not, therefore, be suitable for another. As a further complication the intakes, and probably the requirements, of different nutrients vary in different proportions according to age. With protein the intake increases fairly smoothly from 40 g. for boys and girls at one year, to 80 g. for girls and 100 g. for boys at sixteen years. The calcium intake, on the other hand, remains steady, because the very young, although eating less, drink relatively more milk, which is rich in calcium. The vitamin C consumption may actually fall, because orange juice is given most freely in infancy.

As Bacharach points out, however, we must be careful not to assume that because certain food items are eaten they are therefore necessary. While it cannot be denied that extra allowances of nutrients are demanded by special circumstances, whether carbohydrates and fat in the case of the labouring man or protein and vitamins in the case of mothers and children, the concept of the " man value," intelligently used, may serve its purpose in shaping order out of chaos. A compromise must be chosen between " quick methods which lead to wrong results " and methods which are so slow as to give practically no results at all.

Food Habits

The very rapid, if relatively inaccurate, " questionnaire " method has been employed by Dr. Magnus Pyke on behalf of the Ministry of Food in an extensive survey of the food habits of industrial workers. Various classes of operatives were questioned as to their food consumption during the previous twenty-four hours, portions of food of known size being displayed for comparison when necessary. Great variations in habits were found according to the industrial conditions and local preferences. As many as six meals a day are often taken, when snacks of 200 Calories or more are included. The habit of taking two breakfasts, one at home and another at work, is quite common. Pyke found that the total daily food intake of female Lancashire cotton spinners averaged 2,460 Calories, while men who undertook the heavy work of mule spinning consumed 4,030 Calories. A typical midday meal taken in a canteen supplied a maximum of 850 Calories if taken in full, but most workers were satisfied with 630 Calories, which was, however, more than the 510 Calories they got at home. As would be expected, the proportion of the daily requirement taken in the canteen is much affected by the timing of the shifts. Men who stopped work at 3 p.m. took only 35 per cent. of their requirements in the canteen, as compared with 55 per cent. for men who " knocked off " at 5.30 p.m.

The nature of the food supplied and the size of the meals are obviously important. A hot meal of meat, potatoes and vegetables will not be appreciated if served at the coal face to miners in the heat of their labours. More food may be eaten if two sandwich meals are served instead of one hot conventional dinner. Workers who have to work in cramped positions do not favour bulky food, and a special problem is presented by workers whose dietary habits are upset by changing from day to night shifts. The influence of local taste and prejudice is illustrated by variations in the consumption of cheese, which is much less in Lancashire and Durham than in other districts.

Food at School

According to Miss E. M. Langley the first steps in supplying school meals were inspired by charitable motives in years long before dietary surveys had been placed on a scientific basis. As early as 1862 Victor Hugo supplied forty poor children of Guernsey with a dinner of meat and wine. " The Provision of Meals Act " marked the commencement of official action in 1906. The dinners then provided were a monotonous repetition of hash or soup, bread and rice pudding, at the cost of about 1d. At present the cost of meals is about 5d., and every effort is made to ensure that they are varied and attractive. The official aim is to supply 1,000 of the child's daily requirement of 2,500 Calories, although many experts consider that this standard has been placed too high, unless the Calorie intake can be " boosted " with large helpings of suet pudding. A protein intake of 20-25 g. is attained partially by the allowance of 1 oz. of dried milk for every meal. Other values are 30 g. for fat, 2,450 I.U. for vitamin A, 230 I.U. for vitamin B_1, 5·7 mg. for iron and 425 mg. for calcium. For vitamin C the desired standard of 54 mg. is again hard to attain under practical conditions. In the examination of meals served in Surrey the highest vitamin C content was 35 mg. at one meal. The chief danger of vitamin C shortage occurs with meals which are cooked in a central kitchen, and kept hot in special containers for distribution to surrounding schools. With such " conveyed " meals sliced raw vegetables are served to make good the deficiency. Cabbage is much richer in vitamin C than lettuce.

When the ingredients were still readily obtainable the " Oslo dinner " of milk, brown bread, cheese, salad and an orange was popular with children. With so much hard food to be masticated the meal took a long time to eat, which was considered by some teachers to be a disadvantage for reasons of administration, and by others to be an advantage in resting the children. About 1,500,000 children are now fed at school, as compared with 250,000 before the war.

Food in Sickness

It has long been suspected that there is much room for improvement in the dietary arrangements in hospitals, and recent surveys have fully confirmed this view. Data obtained by Dr. A. Lyall for three hospitals in Aberdeen are probably typical of many more

hospitals throughout the country. In a general hospital with 500 beds, he found, by means of taking an inventory of the items supplied to selected wards, that the food officially provided amounted on an average to only 1,680 Calories, being made up of 65 g. of protein, 70 g. of fat and 183 g. of carbohydrate daily. To make good the deficiency food was brought in privately by the patients' relatives and friends to the extent of 502 Calories daily. The total of 2,220 Calories was thus nearly identical with the estimate of 2,100 Calories quoted by the author for the population in general. It is obvious that in the absence of private food supplies many of the patients would be underfed. In a maternity home the intake as provided officially was 2,200 Calories, which was increased to 2,540 Calories by private extras. Adequate feeding is essential during confinement and lactation, although overfeeding may cause obesity, particularly in mothers with several children. A good diet in a maternity home, moreover, may have more than an immediate effect on the mother, since she may be unconsciously educated into better food habits which will eventually benefit both herself and her family. In a third hospital, which was restricted to chronic diseases, Dr. Lyall found a slightly lower total intake of 2,130 Calories.

In regard to the importance of diet in hospital two distinct schools of thought may be recognised. According to one school direct treatment of the disease is considered, with justification, as the main object. Any minor dietary deficiency which may be incurred during such treatment is considered an insignificant "side-show" in contrast with the disease itself. If a patient with an infection of the adenoids is cured by the surgical removal of the site of infection, then his nutrition while in hospital may be left to look after itself. The second school, while not minimising the importance of the primary disease, attaches great value to good food in maintaining the powers of resistance of the patient, and in promoting rapid recovery. Two instances of the importance of nutrition, both in relation to the vitamin C requirement, are frequently quoted. In cases of gastric and duodenal ulceration it was customary, until recently, to restrict the patients to diets so low in vitamin C that subnormality could readily be detected by tests on the blood or urine. Opinions may be divided as to the real danger of this deficiency, but the risk is now quite unnecessary since vitamin C can be given in tablet form. Perhaps even more important is the influence of vitamin C on wound healing. Dr. Geoffrey Bourne and others have shown that in guinea-pigs the strength of the scar tissue in minor wounds inflicted by a carefully standardised procedure is much affected by the vitamin C allowance. Better healing is found in animals given liberal allowances than in those receiving just enough to maintain life. Dr. Graham is convinced from his experiences in St. Bartholomew's Hospital that early signs of vitamin C deficiency occur occasionally in hospital patients, and that a liberal intake of vitamin C is of real value in expediting recovery from the wounds incidental to operations.

"One Meal" Hospitals

According to Miss M. C. Broatch the main difficulties in supplying good and well-cooked food in hospitals may be traced to lack of staff and of adequate kitchen facilities. The arrangement of contracting for supplies of food is to be condemned as leading to a monotonous diet. Trained food buyers and trained cooks are necessary. Equipment for cooking and conveying food is at present so bad in one large hospital that only one cooked meal per day can be served. Dr. Magee, of the Ministry of Health, goes farther in complaining that many hospitals are not procuring or applying for all the foodstuffs to which they are entitled. Hospital patients are officially entitled to 120 g. of protein daily, including 78 g. of animal protein, but often have to be satisfied with much less. In one hospital no bacon, eggs or butter are purchased.

It is understandable that with limitations both in staff and in funds, and often with old-fashioned buildings and kitchens, some hospitals cannot at present hope to provide what should amount to a first-class restaurant service in addition to their medical and nursing activities. Figures obtained by Dr. C. P. Stewart, of Edinburgh, on the vitamin C content of vegetables as served to hospital patients, however, emphasise the urgent need for reform. The raw vegetables contained 14-41 mg. per 100 g., when freshly cooked 10-38 mg. and when finally reaching the wards only 0·7-3·6 mg.

Co-Ordination and Standardisation

In the world-wide crusade to raise the standard of nutrition in all classes of population a lack of co-ordination in terminology, and in defining the standard of nutrition to be attained, may become one of the most serious obstacles in the path of progress. Even in this country experts are not always unanimous either as to the exact composition of foodstuffs, or as to the amounts of the various nutrients necessary for the maintenance of perfect health. In cases where agreement has been reached here, moreover, it may be found that quite different ideas are prevalent in America. Lease-lend foodstuffs, as Professor Maynard of Cornell University has pointed out, are very apt to change in nutritive value simply by crossing the Atlantic! In addition to real divergencies of data and opinion additional trouble may sometimes result from pure misunderstanding. Thus the Americans fixed the daily requirement for vitamin A at 5,000 I.U., with the understanding that allowance was to include both carotene and vitamin A in the proportion in which they are present in an average diet. For some reason this question of the proportion of the two sources did not "get over" to English experts, and for a time there was a period of confusion as to whether the 5,000 I.U. applied to pre-formed vitamin A or to the pro-vitamin, which is much less efficiently absorbed.

Before the war a technical committee of the League of Nations did pioneer work in fixing dietary standards. Although the evidence which was reviewed in fixing these standards was not always very substantial, they undoubtedly served a useful purpose, and have not yet been entirely superseded. Other standards, often setting the requirements at more generous levels, have recently been proposed by the National Research Council of the U.S.A. In the present period of rapid development in nutritional research it is perhaps over-optimistic to visualise a central inter-allied body which could combine authority with speed of action, so as to compound tables which would keep abreast with the results of current research. If no committee emerges from the Hot Springs Conference capable of dealing

with this arduous task we may at least hope that individual workers will realise the importance of expressing their results in terminology and in units which are clearly understandable to others. Dietary standards based on the investigator's private opinion are not to be encouraged. Subjects, for example, should not be considered deficient in some nutrient simply because they give values lower by some arbitrary extent than the average found in a particular survey. Units understandable only to users of a certain method of apparatus should be avoided whenever possible. Thus the Evelyn photo-electric absorptiometer is most useful for the estimation of numerous food factors, but the occasional practice of expressing results in "L units" gives little information, and much irritation, to workers who do not use this instrument.

Food and Farming

Finally, after nutrition workers engaged in the research laboratory, in commerce, and in the preparation and cooking of food have learnt to exchange ideas in terms which are readily understandable to each other, there remains the necessity of making effective liaison between nutrition and agriculture. To the dietician, as Dr. Kon has pointed out, milk is a valuable food, containing protein, fat, carbohydrate and vitamins in amounts which vary according to season and the feeding to the cow. To the agriculturist, milk is a fluid extracted from the udder of the cow, and produces a certain price per gallon. It is obvious not only that the nutrition worker must be familiar with data, statistics and costs in relation to the production of food, but that the authority responsible for agricultural policy should have a thorough quantitative knowledge of the food value of the different stock and crops which the former is able to produce.

Oat Flour and Fat Oxidation

THE most common flavour defect in foods containing fat is the one arising from an oxidation of the fat which results in a flavour resembling tallow. In the dairy industry this flavour is known under the following terms: "Tallowy," "cardboard," "oxidised," "stale," and "oily." Throughout the year, but especially during the winter months, this flavour is a serious source of complaint in the milk industry.

When cream is frozen and stored, the product is subject to the development of the oxidised flavour, if held too long, or if it originates from a source known to be susceptible to oxidation.

In using an anti-oxidant for preventing the oxidative changes in a food, it is important that the product conform to pure standard and, if possible, should be an edible product. In the past few years cereal flours have been suggested as possible anti-oxidants for foods developing oxidised flavours. Of the cereal flours, oat flour has found favour in certain industries because of its effectiveness in preventing the oxidised flavour.

In this connection Dr. C. D. Dahle and Mr. D. V. Josephson have carried out a series of experiments with frozen cream using as the anti-oxidant a finely ground oat flour. A quantity of 40 per cent. cream was stored at 15° F. for a period of approximately four months. Copper was added to some of this cream to accelerate the production of the off-flavour.

Samples of this frozen cream, when used in the manufacture of ice cream, imparted a distinct off-flavour to the finished ice cream, the experimenters found, whereas the frozen cream treated with the oat flour protected the flavour of the ice cream to a definite degree. In another test in which the cream was stored in a frozen state for 140 days, almost identical results were obtained. It was found that 0·5 to 0·7 per cent. added oat flour delayed the onset of the oxidised flavour for several weeks in most cases.—*Milk Messenger.*

F.B.I. and Industrial Research

THE Federation of British Industries has decided to strengthen its organisation on the research side by making its Industrial Research Committee a permanent Standing Committee of the Federation with its own fully qualified Secretariat.

The Federation while not itself engaging in research will, through the work of its Standing Committee, do all in its power—in collaboration with existing organisations in this field—to promote the interests of industry in relation to research and its application. At the same time, it will make every possible effort to secure the success of any wider or more comprehensive organisation which may result from the present widespread interest in the problem of research.

The terms of reference of the Industrial Research Committee are:

To stimulate national interest in research for industry and foster it in all appropriate ways, such as—

Encouraging industrialists to devote a more adequate part of their resources to the promotion of research and its application to existing products and to the development of new products.

Providing money for the creation and maintenance of adequate facilities for post-graduate research.

Encouraging the education of the necessary research and development staff of universities, technical colleges and industrial establishments.

Promoting contact and collaboration wherever possible between centres of industrial research or institutions and research workers.

Facilitating co-operative research within British industry, with special reference to the needs of small-scale industries.

Providing information on research questions by creating a liaison with appropriate reference libraries and technical and scientific institutions.

Calling attention to the publications of professional, technical and scientific institutions, assisting where necessary in their distribution, and encouraging the provision of literature on matters not already adequately covered.

Promoting the compilation of general information on industrial research, particulars of organisations and the facilities available.

Providing from time to time information for press and public on the achievements of British industrial research, and stimulating world interest in them.

The Chemist in the Public Health Service

AT THE present time everyone is talking about reconstruction and post-war development, but no responsible body has made any suggestions with regard to the place of the chemist in this scheme. Medicine has been described as the process of putting drugs, of which little is known, into bodies of which we know less, but it is being realised this outlook is fundamentally wrong and that the correct method by which to maintain public health is by preventive medicine. If medicine is considered dispassionately it must be admitted to be a branch of applied biochemistry. That it is being gradually appreciated that medicine of the future will be recognised to an increasing extent as a biochemical subject is seen by the appointment of a biochemist as the Director of the National Institute for Medical Research, while the Director of the Dunn Nutritional Laboratory at Cambridge is also a biochemist.

A Vast Field

A superficial glance at the different aspects of chemistry concerned with public health shows the vast field covered without encroaching on what may legitimately be described as the doctor's province. The examination and control of foods include not merely the ordinary analysis, but the effects of vitamins, enzymes, trace metals and similar minor constituents. Water is a large subject, including drinking waters, bath waters, and the treatment of effluents and river pollution. Public health chemistry also concerns itself with the examination and control of drugs, either for human, animal or plant purposes, and the analysis of feeding stuffs and fertilisers. The routine analysis of blood, urine, fæces, cerebrospinal fluid and similar specimens is primarily chemical, and the chemist is responsible for toxicological examinations and other work of a forensic nature. Although the ætiology of diseases such as silicosis and cancer is not yet complete, the importance of the chemical aspect is becoming more fully appreciated as the vista opens. Allergy, hypersensitivity, and similar troubles are in the main chemical, while immunochemistry is now a recognised field of study. The reactions caused by enzymes in the animal and vegetable structure are chemical and physical processes, which are being worked out in the laboratory, and it has been shown that glandular therapy and hormone control are primarily chemical problems. If preventive medicine is to be properly developed, there are many other problems in which chemists will have to play a leading part, among which may be mentioned:

(1) To what extent are compounds such as cholesterol, the bile acids, the sex hormones, vitamin D, and heart stimulants of the digitoxenin type connected and what is their relationship, if any, to cancer?

(2) How far are enzymes, hormones, and chemicals interdependent or antagonistic as, for example, the rôles of the parathyroid hormone, the phosphatases, vitamin D, and phytic acid in the metabolism of calcium?

(3) Tuberculosis, although a bacterial disease, is now commonly described as a deficiency disease. To what extent are other micro-organisms and viruses parasitic and saprophytic and what are the conditions, chemical or physical, predisposing to one state or the other?

If, therefore, preventive medicine is to take its proper place in the maintenance of health, chemistry must be one of the controlling factors, and the chemist himself will have to learn to take a greater interest and a hand in the control of public affairs.

Ancilliary Services to Local Authorities

Apart from the chemical work of a direct public health nature chemists render many ancillary services to local authorities, and of these the chief are still probably concerned with bacteriological examinations. The first bacteriologist was a chemist, Pasteur, who was violently opposed to the medical profession of his time, and it is therefore strange that strong efforts are now being made to claim bacteriology as a medical science. This claim entirely overlooks the fact, for instance, that the nutrifying bacteria in the soil do more good than all plant disease-producing organisms do harm and possibly more good than all harmful organisms combined do damage. Professor Swingle points out in his introduction to *General Bacteriology* that bacteriology is an independent science interlocking closely with other biological sciences and with chemistry and physics. Due to the increasing extent to which microbiological processes are being applied in industry, it is probably preferable to link this science with the public health laboratory rather than continue efforts to bracket it purely with clinical medicine.

Other types of examinations made for authorities are concerned with lubricating and other oils, petrols, soaps, antiseptics, cements and building materials, and similar substances of which the chemist, who is a Jack-of-all-trades, can know but little.

The Status of Chemists

If the conditions of chemists employed in public health work are examined, it will be realised that their status is at present in a most unsatisfactory position. The Chief Chemist and the Chief Alkali Inspector at the Ministry of Health rank for salary purposes on the same level as an ordinary medical officer of health, there being six higher grades of medical officers above this rank. At the London County Council the chief chemist is again ranked as a third or fourth grade officer in the Public Health Department. Both the Metropolitan Water Board and the Metropolitan Police Laboratory consider that it is essential to have a medical director in charge. Many hospitals employ biochemists, but it is almost invariably found that if

Abstracted from an address given by Mr. Thomas McLachlan, Chairman of the London Section of the British Association of Chemists.

the biochemist does not possess a medical qualification he is placed as a subordinate to the pathologist or to some other medical officer.

With the preparations for the present war the Ministry of Health saw fit to make yet another inroad into the work of practising chemists by establishing the Emergency Medical Services and advising Local Authorities to send waters to these laboratories for examination, thus duplicating a service which was already provided. The position of public analysts and official agricultural chemists has not improved recently. Previous to the 1938 Food and Drugs Act there was no provision for the assumption that the medical officer had any jurisdiction over the public analyst, but this Act, being a Consolidating Act, has brought together certain functions including those of the condemnation of unsound meat and the investigation of cases of food poisoning, where it is laid down that the medical officer of health shall be responsible and, by inference, certain medical officers claim that the public analyst has now been placed officially under their jurisdiction. The possibility of this claim being made is strengthened by the fact that the appointment of public analysts is frequently delegated to the public health committees of councils, and that these committees are usually dominated by the medical officer of health. From the legal standpoint the position of the part-time public analyst is worse than that of the full-time analyst, since the former ranks as a contractor to his authority, while the latter is an officer. Section 94 of the Food and Drugs Act relieves an officer of a Local Authority from personal liability in respect of any act done by him in the execution of his duty, but this Section affords no protection to the part-time analyst.

It may be here pointed out that Section 16 of the Fertilisers and Feeding Stuffs Act provides that an inspector under the Act shall be liable to a penalty of £50 for disclosing any information obtained by him except to people acting in the execution of the Act. The result of this Section is to nullify those Orders issued by the Minister of Food for the control of fertilisers and feeding stuffs, because these orders are enforced by the Minister of Food's enforcement officers and not by officers of the Local Authority or the Minister of Agriculture.

Especial reference was made to the position of the part-time analyst in a pamphlet on "Conditions of Appointments of Public Analysts and Official Agricultural Chemists," issued jointly by the Royal Institute of Chemistry and the Society of Public Analysts and other Analytical Chemists in 1927. It was pointed out that their position had deteriorated since the passage of the first Food and Drugs Act, when adulteration was crude and a few simple tests sufficed to detect it.

Remuneration of Analysts

With the advance of knowledge more is known about the effects of food treatment and its nutritional aspects while the methods of adulteration and sophistication have also become more refined. These have, in turn, increased the difficulties and the responsibilities of public analysts, resulting in the expenditure of considerably more time and the use of elaborate apparatus for their work, and yet it is found generally that, if anything, so far from their remuneration being increased there has been a tendency to reduce it. When the 1875 Act was passed a fee of a guinea or more was usually paid to the public analyst and, although it was stipulated in the Act that a fee of 10s. 6d. was chargeable to a private purchaser, the then President of the Board of Trade stated in Parliament that he assumed that the difference would be paid out of the rates. At that time and for many years it was the custom for a public analyst to take articled pupils, and to this day some private laboratories are staffed almost entirely on this basis, but, in my opinion, it is unfair with modern conditions of university education to take in either the pupils or their parents. The result of present conditions has militated seriously both against the position of the public analyst and also against the public interest and has brought about a whole series of cut-throat competition.

Industrial Chemists

It may be said that it is just as well for official chemists to be badly paid because it will attract better chemists to industry, but that is a very short-sighted policy. Admittedly if industry is prepared to offer larger sums to chemists than the Government and Local Authorities industry will attract the more progressive man, but industry also watches the salaries and conditions of employment of official chemists and sets its standards by them, so that it is in the interests of every chemist to see that the prestige of his profession is maintained in every walk of life. If officialdom places the knowledge and work of chemists on a lower plane than that of members of the legal profession, medicine, engineering, etc., it follows that industrial companies will probably think along the same lines. Bad conditions of practice and work in any one branch of their profession must have their repercussions on chemists working in other fields and militate against the interests of chemists in general.

Public and Parliamentary Opinion

The marked influence of organised action on public and parliamentary opinion is shown clearly by reference to one or two pamphlets issued recently, and this influence is interesting as it serves to illustrate the necessity for public education by the chemical fraternity. In *A General Medical Service for the Nation*, issued by the B.M.A. in 1938, there is a reference to the need of laboratory services as one of the main basic principles of the scheme, and although no further special prominence is given in the report there are several other direct or indirect references to their necessity. In the Draft Interim Report of the Medical Planning Commission of the B.M.A. in 1942, the reference to the laboratory side is not stressed so greatly, and finally the White Paper issued by the Minister of Health and the Department of Health for Scotland consider the laboratory side of the health service of such minor importance that it is not even mentioned. Against this one may legitimately place the opinion of Sir Henry Dale in the last Hanbury Memorial Lecture to the Pharmaceutical Society, in which he deals with the development of chemotherapy and its effects on pharmacy and on clinical biochemistry. Coupled with these changes it is only necessary to consider the other changes which have proceeded, almost unnoticed, during the last thirty years, leading to the passage of the Therapeutic Substances Act in 1925 and its subsequent development, together with the establishment of nutritional laboratories and nutritional standards.

Future of Public Health Chemical Work

Concerning the organisation of the public health chemical work of the future, preliminary arrangements have already been commenced by the control of substances prepared under the Therapeutic Substances Act at the National Institute for Medical Research. The Ministry of Food has now seen fit to license certain laboratories for the examination of flour, which is a step in the right direction. With the present development of industry, including the food industries, pharmaceutical manufacture, etc., there is little to be gained by sending odd samples to small laboratories, in which there is no adequate provision for their examination, but there is still some necessity for samples to be taken at random from retail shops and to be examined thoroughly for their keeping qualities under all sorts of conditions. We have now become accustomed to some sort of regional control, and public health laboratories should be established on a regional basis, so that all types of samples can be sent to them. Such laboratories should deal with some 20,000 to 100,000 samples per annum and should be fitted with the most up-to-date equipment and should be staffed with specialists in particular branches of chemistry. Allied sub-regional laboratories could then be placed at convenient centres to deal with routine work, such as the chemical and bacteriological examination of milks, preservatives in perishable samples, medical specimens for the health centres which it is proposed to establish, and similar work of a more or less elementary nature or requiring immediate attention. These smaller laboratories could perhaps be privately owned or publicly owned and staffed from the larger laboratories. The heads of the regional laboratories would necessarily be chemists of the highest calibre possessed of a wide fundamental training and outlook, capable of ranking with men of equal prominence in other walks of life and they should be remunerated accordingly. If the sub-regional laboratories are privately owned they should be regularly inspected by an inspector of the Ministry of Health or of whatever Ministry may approve them. Even the larger laboratories should be inspected regularly by some outside representative. Moreover, the established staffs of these public health laboratories should not be recruited direct from the universities, but should have previous experience in other walks of life. The Government Laboratory should fit into this scheme as a referee laboratory only, and, to perform this function independently and effectively, it should come under a different department of the Government from that which controls other laboratories.

The Fixing of Standards

With regard to the fixing of standards for foods, pharmaceuticals, fertilisers, feeding stuffs, etc., it is essential that the present practice of endeavouring to establish standards in Court, or as happens under the Fertilisers and Feeding Stuffs Act doing practically nothing, should be abolished. All standards should be arranged by an independent Standing Committee of the responsible Ministry, and on this Committee would be representatives of the trades concerned, of the public health laboratories, of the Ministry and of the public, together with, where necessary, representatives of the medical profession. Once standards have been established it merely remains for the Courts to enforce them on evidence supplied by sampling officers and analytical experts.

The idea of all this centralisation may not appeal to the individualist, but it seems to be the only logical solution of the present position. My view is that rationalisation will be the order of the day for some years to come, although to what extent it will eventually lead to a general nationalisation of everything and everybody no one can foresee at the moment. While this process is going on it will be necessary frequently to subordinate private interests for the benfit of the community. There will come a time, however, when this general tendency for centralisation will again break down at least to some extent. By that time we shall have learned to live in smaller communities, learned that excessive concentrations of population in small localised areas are against the general welfare of the community; that fresh food, properly produced and safely handled, is essential for good health, and that this good health is best secured by healthy living under healthy conditions. This will increase the importance of the local unit once again, but that day is not yet on the horizon.

Home Preservation of Food

THE war has given considerable impetus to the domestic canning and preserving of garden produce. During the fruit season, women's institutes all over the country have been converted into miniature canning and bottling factories and strenuous scenes have been witnessed in kitchens, bestrewn with such unaccustomed utensils as thermometers, in which anxious but determined housewives have striven with knotty problems such as the co-ordination of processing time with closing speed and the like.

Among the batch of books before me is a paper-covered Bulletin* of sixteen pages from the Oregon State College. It starts off with the question "Why do Canning?" and the Victory motive is postulated. The aims of home canning are: (1) safety for use; (2) freedom from spoilage; (3) palatability and attractiveness; amounts and choice of foods carefully planned so that the family is assured enough for a year-round supply and also a well-balanced selection for good nutrition.

This little bulletin is an excellent example of compression without sacrifice of clarity. The essential operations for the canning of fruits, vegetables, meat and poultry and fish are described in eight pages, with a good account of the working of a pressure cooker for good measure. The other half of the bulletin tells of drying fruits and vegetables; salting vegetables; and corning beef; as well as giving in three tables synopses of times and temperature of processing.

My second book† is more pretentious. In fact, the dust cover makes the claim that it is "unlike any other book covering the preserving of food in the home, since it contains full and precise information on salting and, in addition, covers canning, drying and freezing."

It is possible that this book suffers from having been read immediately after the first one. The author uses nearly three-quarters of a page in his preamble. His

second paragraph starts off with: "Salt is mighty important in the daily life of all animals . . ." and in a whole page talks about metabolism; selective action of salt on micro-organisms; sugars in vegetables; fermentation. The first book epitomises, in five lines, all he has said about this.

The information given is in some cases a little vague. For instance, in the chapter on the curing of meat, it is said: "Small quantities of saltpetre are added to fix or preserve the red colour of the meat."

The recipe for corned beef consists of rubbing the meat with salt and allowing it to stand for twenty-four hours. Then a "brine," consisting of 10 per cent. solution of sugar, with saltpetre and soda, is poured over the meat, which is allowed to "cure" for thirty to forty days. The author does not mention that beef may be cured in fourteen hours.

The section on canning runs on conventional lines—there is little new that can be said about the subject, in any case. Some useful tables (from the Farmers' Bulletin No. 1,762, U.S. Dept. of Agriculture) are given.

The chapter on drying gives instructions on the construction of home-made sun and and cookstove driers, and goes on to describe methods of fruit and vegetable drying. The preparation, blanching and drying details are given in tabulated form. It is difficult to visualise the period in which a drying outfit will form a part of the normal equipment of a home.

Why should the chapter on freezing be included in a book on home preserving? Among the directions for freezing vegetables it is said: "Place in sharp freezer-room at −15 to −25° F. for eight to twelve hours until frozen solid."

My last book is a Penguin.‡ The author worked as a chemist on fruit products at Messrs. Lyons Research Laboratories and later joined the Long Ashton Research Station and has since specialised in the domestic side of preserving. Miss Crang is taking no chances. In her preface she says that "this book is not intended to be a recipe book, but a guide to those interested in preserving, and to suggest the best method to adopt under present conditions." In fact, purely a war-time book. In the same place she recommends those who would like more detailed information on the subject to obtain Bulletin No. 21 of the Ministry of Agriculture and Fisheries.

I do not know why Miss Crang needs to be apologetic (if, indeed, she means to be) as her directions are remarkably clear. Her style is soothing. While reading, one can almost hear a conversation of "one woman to another" and the gentle clink of the teaspoons. She skilfully interpolates a couple of pages headed "What makes Jam Set?" In italics she says: "This section is for those who like to know the why and the wherefore. For those who have no time to spare, but just want to make jam, see the next section." What could be fairer than that?

This little book can be recommended.

T. C.-W.

* *Home Food Preservation by Canning, Drying, Salting*, compiled by Lucy A. Case. Oregon State College. Extension Bulletin 596.

† *Home Food Preservation*, by Frederick W. Fabian, Ph.D. Pp. 138+iv. $1.50.

‡ *Preserves for all Occasions*, by Alice Crang. A Penguin Handbook. Pp. 96. 9d.

Consolidation of Meat Products Orders

THE Minister of Food has consolidated the Meat Products and Cooked Meat (Control and Maximum Prices) Order, 1942, as amended, the Canned Meat and Canned Soup (Control and Maximum Prices) Order, 1941, as amended, and the Imported Canned Meat (Maximum Prices) Order, 1943. The new Order came into force on July 9, 1944. The principal changes are:

The new Order provides for the increase of meat content of pork sausage and pork sausage meat (including pork slicing sausage) from 37½ per cent. to 50 per cent. (with a tolerance or margin of 2½ per cent. below and 5 per cent above). The meat content of beef sausage and beef sausage meat (including beef slicing sausage) remains 37½ per cent. The inclusion of 7½ per cent. low fat soya in pork and beef sausages and sausage meat is maintained in the new Order, which prohibits the use of any other soya product in pork and beef sausages and sausage meat, and of certain offals—namely, brains, feet, fries, gut, lights, manifolds, melts, paunches, sweetbreads, tripe and udders.

The maximum wholesale and retail of pork sausages and pork sausage meat are increased by 1½d. per lb. Persons were permitted to manufacture and sell by wholesale pork sausage and pork sausage meat of the new meat content and at the new maximum wholesale prices as from July 3.

The meat content of meat paste is standardised at 55 per cent., and the fish content of fish paste is increased to 70 per cent. (with tolerance or margin of 5 per cent. above and below each figure); the increased content applies equally to paste in airtight containers and to "open" pack pastes, except that it was permissible to continue manufacturing the former to the old specification until July 30, 1944. Maximum prices will remain unchanged.

Pork slicing sausage and beef slicing sausage are included among the specified foods in the new Order, and will be sold at prices applicable to pork and beef sausage meat respectively. Hogs pudding and haslet or aislet are now included in the list of permissible products.

Provision has also been made in the new Order for the addition of 1½d. per dozen containers to the maximum price of canned soup on a sale by wholesale as an allowance for breaking bulk; this provision does not apply to meat or fish paste, but will apply to home packed canned meats when available for civilian consumption.

The Order provides that the minimum "solid" content of canned soup shall not include bone.

Canned Vienna Sausage and canned Pork and Soya Links have been added to the schedule of imported canned meats for which maximum prices are prescribed, but no supplies are at present being distributed for civilian consumption.

The present supply position enables the Minister to allocate additional supplies of manufacturing meat to manufacturers so as to ensure the maintenance of existing output of sausage. The increased allocation and higher meat content of the pork sausage are temporary measures subject to revision or cancellation at short notice.

The Baking Industry and the E.W.O.

THE Baking Industry is now within the field of the Essential Work (General Provisions) (No. 2) Order, 1942, and the following remarks will be of interest to all bakers:

When an undertaking is scheduled the effects are briefly that

(*a*) The right of the management to discharge, and of the personnel to leave, is strictly controlled and is in general subject to permission of a National Service Officer and to at least one week's notice.

(*b*) A guarantee of the normal wage for normal working hours at the appropriate time-rate is given, subject to specified conditions.

(*c*) It is an offence for a worker to absent himself or be persistently late, without reasonable excuse.

(*d*) Cases of alleged failure to obey lawful and reasonable orders will be dealt with under a special procedure.

It is open to any undertaking to apply to the Ministry of Food for scheduling, and if scheduled all workers (except shop assistants) engaged in the bread-making and flour confectionery-making industry will be covered.

The Ministry of Food will, if it thinks fit, recommend for scheduling undertakings which have not applied.

Only undertakings observing wages and conditions agreed between the employers and workpeople concerned will be scheduled, and accordingly—

(*a*) in districts covered by collective agreements, only undertakings observing these agreements, or whose wages and conditions are accepted by the employers' and Trade Unions' representatives concerned to be not less favourable than those laid down in the collective agreements will be considered for scheduling;

(*b*) in other areas, undertakings will be scheduled only if representatives of both sides of the industry agree that the wages and conditions observed by the undertaking can be accepted as a satisfactory basis for scheduling.

NOTE.—Trade Board rates and conditions will not be regarded as a basis for scheduling unless both sides agree, either generally or in respect of a particular district, to accept this basis.

Where the Ministry of Food desires to have an undertaking scheduled in an area not covered by a collective agreement, the Ministry of Labour and National Service will help, if requested, in initiating negotiations with a view to establishing an agreement on the basis of which the undertaking can be scheduled.

It is not the intention that scheduling should be used to impose night baking in any undertaking where this is not the present practice. Accordingly, workers in scheduled undertakings which are not at present baking at night will not be required to engage in night baking unless the changeover is an agreed one or, failing agreement, the Ministry of Food indicates that in their view the national interest required night baking at the undertakings in question.

Neither the Ministry of Labour and National Service nor the Ministry of Food will have regard to whether or not a particular firm is scheduled in considering whether the work done in it is essential in connection with the placing, withdrawal and call-up under the National Service Acts of individual workers.

If there is any further point about which information is desired regarding the operation of the Essential Work Order, enquiry should be made of the Manager of the local Employment Exchange of the Ministry of Labour.

Application from undertakings wishing to be scheduled should be sent to the Director of Bread, Bryn Duryn, Dinerth Road, Colwyn Bay, in the following form:

I/We hereby make application to be scheduled under the Essential Work (General Provisions) (No. 2) Order, 1942.

*There is a collective agreement with Trade Unions covering the area in which the undertaking is situated and the wages paid are not less than those provided for in the collective agreement.

*This district is not covered by an Agreement with the Trade Unions.

Our normal working hours of baking are from a.m to a.m; p.m. to p.m.

Is the undertaking a member of any Employers' Association or Federation? If so, give name and address of the Orgnisation.

Are the workpeople members of a Trade Union or Unions? If so, give name and address of the Unions concerned.

Are wages and conditions regulated by:

(*a*) Statutory provisions such as trade boards;

(*b*) Agreements of joint bodies operated on a voluntary basis;

(*c*) Collective agreements between employers' organisations and trade unions. If so, what is the district concerned;

(*d*) Separate agreements between the undertaking and a trade union or unions; or

(*e*) Negotiations between the management and the workpeople; either direct or through elected representatives other than trade unions.

(Answer "Yes" or "No" to each question above, and give particulars and arrangements adopted.)

Name of undertaking

Address

Date

Signature

Position held

* Strike out whichever is inapplicable.

Fat-Peroxides in Milk Powders

A NEW method of determining the fat-peroxides in milk powders which is more sensitive than other methods is described by R. A. Chapman and M. D. McFarlane in the *Canadian Dairy and Ice Cream Journal*. The results bear a close relation to the keeping qualities of milk powders. The addition of modified wheat germ oil to the equivalent of 0·1 per cent. of the butterfat had a stabilising effect and delayed rancidity.

A colorimetric method based on the oxidation of ferrous to ferric iron and the determination of the latter as ferric thiocyanate has been found suitable for the estimation of fat-peroxides in milk powder.

Peroxide values determined by this method are considerably higher than those obtained by an iodimetric procedure.

Schedule D Income Tax Assessments

ALTHOUGH much publicity has been given recently to income tax, that has referred to Schedule E (Employments: Pay As You Earn), and this very publicity may cause some confusion as regards Schedule D (Business Profits: Persons On Own Account). Assessments under Schedule D are made on income for the year preceding year of assessment, thus currently for year ending April 5, 1944, or earlier date (*e.g.*, December 31, 1943), according to the accounting year ending date of the firm concerned; payment of tax will be required in two equal instalments on January 1 and July 1, 1945.

Contributions and premiums payable under the War Damage Acts, 1941 to 1943, are not deductible for income tax purposes; on the other hand, payments for national defence contribution and excess profits tax and premiums under the War Risks Insurance Act, 1939, are deductible.

Interest received on treasury tax reserve certificates (taken out in advance of tax payments) is not chargeable with tax, but interest received where war damage contribution is paid in advance is assessable.

For life assurance premiums a deduction is allowed, but now only at 3s. 6d. poundage on premiums paid. There are certain other restrictions also, but as regards that which limits the allowance to tax on one-sixth of total income the income to apply (if higher) can be that for year ending April 5, 1939, which really is concessionary to persons with war-time incomes lower than pre-war, allowing insurances to be kept at pre-war levels if thought desirable.

As regards A.R.P. matters, anything of the nature of machinery and plant (*e.g.*, fire appliances, etc.) attracts "wear-and-tear" percentage allowances, but the cost of other items such as equipment and stores for first-aid parties, respirators, protective clothing, wire netting, blinds, screens, cost of training employees, paint, etc., is deductible as trading expenses.

For fire watching there is a Government standard subsistence allowance, but it has been recently stated that if anything is paid by the employer in excess of this, this excess is not allowable for tax deductions; of course, in the case of full-time fire watchers the wages paid, if reasonable, are deductible.

Many employers encourage employees to purchase war savings certificates by contributing to the cost, and this is allowable as a trading expense for tax purposes if of a reasonable proportion of the cost; a Government spokesman has stated that up to 10 per cent. of the cost is considered reasonable.

Under the concentration of industry schemes the displaced firm is assessed for tax on profits received from the fully operating firm (*e.g.*, the "nucleus firm), and "wear-and-tear" allowances continue although the machinery and plant (of the displaced firm) may not have been used in the period under review.

The ordinary yearly percentage allowances for "wear and tear" of machinery and plant (term widely interpreted, including motor vehicles, fittings and fixtures, office appliances, etc.) continue, as does the extra one-fifth which applies to all trades (*e.g.*, motor vehicles ordinary 20 per cent. plus one-fifth 4 per cent., total 24 per cent), and where through war-time conditions machinery and plant is worked more than in pre-war times (*e.g.*, overtime, continuously, etc.) an additional allowance can usually be obtained. As some guidance to this extra allowance (individual circumstances are taken into account) it should be noted that there is a general agreed rate for commercial motor vehicles, so that where war-time working shows that the normal allowance is inadequate an additional one-quarter of the usual allowance applies.

There is also another allowance, which applies where there is exceptional depreciation in buildings, machinery or plant (provided since January 1, 1937) which with the end of the war may have depreciated in value or become redundant; if the necessary conditions seem present, an amount on account may be allowed each year before final settlement.

Food Rationing and Supply

FOOD rations are highest for manual workers in Russia and fall step by step for those in other categories, according to a report on Food Rationing and Supply issued by the League of Nations and distributed in the United States by the Columbia University Press.

Russia divides consumers into four categories for purposes of rationing with manual workers at the top, followed by office workers, adult dependents and children under thirteen in that order.

Rations are honoured in full in North America, United Kingdom, Sweden and Switzerland, and as a rule in Germany, but not in occupied countries, the report says.

Tables have been prepared to show the number of Calories used by the body in performance of daily work. The League of Nations survey shows how much more energy is required by a woman engaged in housework than one who is a seamstress.

Men on the average require more Calories than women, the report says, showing what the requirements are for various types of work from that of a shoemaker to the energy consumed by a farm labourer.

Muscular activity requires a basic allowance of 2,400 Calories net, the report declares. The League of Nations Health Organisation gives the following average supplement: Light work up to 75 Calories per hour, moderate work 75 to 150 an hour, hard work 150 to 300, and exceptionally hard work 300 Calories and up.

Age is also cited as an item to be considered in counting Calories for the individual, according to the report, which pointed out that an adolescent boy may consume 3,500 Calories in a day, while a small fraction of that amount would suffice for persons over seventy.

Germany follows somewhat the same system as Russia, with a light worker's rations containing 2,285 Calories, a heavy worker's 2,685 and a very heavy worker's 3,435, as compared to the normal consumer's rations of approximately 2,000 a day.

This is not below pre-war standards of what is considered normal consumption, the League survey reveals.

Trade News

Fluorescent Tube Lighting

A lighting problem can sometimes be solved by a study of colour requirements. At times it may be the intensity of light directed on the work that requires careful consideration, more often than not shadows have a direct bearing on the case, particularly shadows of heavy and harsh outline, produced through over-emphasis of the light value alone. Glare is frequently associated with the higher intensities, and glare can give rise to disability or discomfort conditions.

A planned relighting scheme embracing all these considerations has recently been installed in a national butter blending and packing factory. "Sieray" 80-watt fluorescent tubes, in slotted top reflector fittings, were introduced to substitute the existing standard tungsten filament lamps, and placed in suitable positions to illuminate the intricate packing machines.

The benefits of the new lighting were immediately apparent, with a reduction in the loading. The colour question was solved; a good intensity of illumination was provided, not only on the machines and scales, but for general shop lighting also, which the illustration depicts.

As the upwardly directed light results in an illuminated ceiling, overhead gloom is disposed of. No glare discomfort exists. Shadow outlines are soft, due to low surface brilliancy and the length of the tubes.

The relighting scheme was planned by the technical staff of Siemens Electric Lamps and Supplies, Ltd., illuminating engineering department, in collaboration with the proprietors' engineering staff.

Hiduminium Applications, Ltd.

A new company has been formed by High Duty Alloys, Ltd., Reynolds Tube Co., Ltd., and Reynolds Rolling Mills, Ltd., to collaborate with designers and constructors in any industry to secure the best use of Hiduminium aluminium alloys. Further information will be sent on request to Hiduminium Applications, Ltd.

* * *

Mr. Victor F. Saulet

The Industrial and Engineering Development Association announces the appointment to its staff of Mr. Victor F. Saulet as engineer and technical representative. He is well known to steam users both at home and in France, having represented Messrs. Bennis Combustion, Ltd. (late Ed. Bennis and Co., Ltd.), for over 28 years in both countries.

* * *

Fitness in Industry

A provision which has proved immeasurably helpful in keeping workers toned and fit despite long hours and short holidays is the practice of the "sunshine break." This usually takes place twice a week, particularly during the winter months: workers leave their benches or offices on a prearranged rota, and after stripping to the waist are "bathed" in ultra-violet rays from quartz lamps. These rays regularly applied constitute a systemic tonic which goes far to make up for lost sunshine and lack of seaside holidays. A well-illustrated booklet, *Fitness in Industry*, gives an interesting account of industrial sunbathing, which actually goes back many years in British industry, although wartime needs have widely extended it. The subject is described under headings: first a brief historical introduction, followed by a short analysis divided into various sections of industry and the fighting services, with an extensive and well-documented section on results and some useful hints of practical application. There is also a special section for industrial medical officers. The booklet may be obtained from Hanovia, Ltd., who will send a copy to any employer interested in providing sunbathing facilities for his workers.

* * *

Lieut.-Colonel C. V. Jones

The appointment of Lieut.-Colonel C. V. Jones, C.B.E., as President of the Food Manufacturers' Federation, draws attention to the special functions this trade association has been called upon to perform during the war.

It is clear, however, that the work of the Federation in representing this vital industry during the post-war period of reconstruction and beyond will be of even greater importance.

Lieut.-Colonel C. V. Jones has many connections with the food industry, and also with the chocolate and confectionery industries.

He is deputy chairman and managing director of Foster Clark, Ltd., managing director of Associated Biscuit Manufacturers, Ltd., deputy chairman of Peak Frean and Co., Ltd., chairman and managing director of Suchard Chocolate, Ltd., and director of Eagle Star Insurance Co. (Maidstone Board).

During the war Lieut.-Colonel Jones has been chairman of Advisory Committees to the Ministry of Food. He is on the Executive, Grand Council, and Empire Committee of the Federation of British Industries, and is chairman of their Concentration of Production Committee.

Mr. Arthur E. Skan

Mr. Arthur E. Skan has joined the board of directors of George Ellison, Ltd., and of Tufnol, Ltd.

* * *

Change of Title

John Thompson (Kennicott Water Softeners), Ltd., of Wolverhampton, advise that the title of their firm has been changed to John Thompson-Kennicott, Ltd.

* * *

Air Sterilisation

Industry can now safely apply a principle widely used in the hospital field—the germicidal effects of ultra-violet rays to the disinfection of the air—in plants and offices through the use of a new device known as Hygeaire System.

Hygeaire System is a combination of the G.E. Germicidal Tube and a patented reflector in the fixture designed to project a zone of protection across an area above eye-level. Air-borne bacteria and viruses are carried into the zone of ultra-violet rays and to their death by convected air currents, giving to the protected space the germicidal effect of 100 air changes per hour. In Hygeaire System many have found a new tool with which to combat absenteeism, disrupted production schedules, and unavailability of key personnel.

It is made by the American Steriliser Co., Erie, Penna.

* * *

Electronic Cooking

Food processing applications of the science of electronics were outlined by V. W. Sherman, Federal Telephone Radio Corp., Newark, N.J., at the March dinner meeting of the Chicago section, Institute of Food Technologists.

Sherman reported that dielectric heating, achieved by placing the food product to be treated between two plates, has been utilised with good results in cooking and dehydration of food products, as well as in sterilising such products as flour even after the material has been packaged. Electronic heating has no counterpart in other heating processes, he stated, since it results in the creation of a uniform temperature *within* the product being treated.

Products having a uniform section, he explained, are most adaptable to cooking by the electronic method; results in cooking steak were somewhat complicated by the presence of fat. The electronic equipment would be adaptable for the purpose of defrosting meats and poultry.

The equipment used in the applications described is produced in the form of compact units readily lending themselves to food plant installation and requiring no special skill to operate.

OBITER DICTA

● The Ministry of Agriculture and Fisheries did not care two hoots about the fisheries section. —*Alderman H. A. Hind at the annual meeting of the Trent Fishery Board.*

● The consumption of dried eggs in Britain had reached a new level and had been responsible for maintaining morale through proper feeding.—*Mr. John A. Peacock, director of Egg Supply, British Ministry of Food.*

● What is dripping? — *The Clerk, West Hartlepool Police Court.*

● At the moment when the supply of anything is sufficient then the rationing should come off.—*Colonel Llewellin.*

● The other day in a butcher's shop I saw some joints of meat marked "utility".—*Letter to "The Times".*

● To produce a safe raw milk would take years and millions of money, and its price to the consumer would be absolutely prohibitive.—*Dr. J. G. Davis.*

● Foods available in the U.S. for export constitute only a small proportion of the food requirements of the United Nations and liberated areas.—*Mr. Marvin Jones, War Food Administrator, U.S.*

● The luxury feeding and trading in foods in the West End of London is a nasty carbuncle on the system of distribution. — *Dr. Haden Guest, speaking at a Conference on Evasion of Rationing Regulations.*

● I well remember dreaming on two consecutive nights of omelettes and treacle pudding. —*Dr. A. W. Vaughan Eley, who has been a prisoner of war.*

● In the preparation of plans for the organisation after the war of scientific research in the national interest, special consideration will be given to improving the existing ways in which the results of scientific research can best be made known and applied to the development of industry and the fighting services. — *The Lord President of the Council (Mr. Attlee), in the House of Commons.*

Obituary

Mr. Stanley Hodgkin

We regret to record the death of the senior director of the Pulsometer Engineering Co., Ltd., Mr. Stanley Hodgkin, who passed away suddenly and peacefully on June 29, in his 85th year.

* * *

Mr. Llewellyn Jones

It is with regret we record the death of Mr. Llewellyn M. Jones, director and manager of Ledbury Preserves (1928), Ltd., who had been with the company since its formation.

The managing director, Mr. Watkin Jones, will still continue to manage the business, but in his absence all enquiries can be made to departmental managers, as follows: Works manager and fruit buyer, Mr. G. E. Knight; sales manager, Mr. B. W. Hodges; secretary, Mr. K. Baker.

Agricultural Mortgage Corporation

It is announced that the Midland Bank has become a member of the Agricultural Mortgage Corporation. The decision thus carried into effect was based upon the view that financial measures forming part of the Government's policy of securing a "healthy and well-balanced agriculture" called for the united support of the banks, more especially having regard to arrangements embodied in the Agriculture (Miscellaneous Provisions) Bill, now on its way through Parliament, which will

enable the Corporation to make long-term loans to agriculture for capital purposes on terms substantially more favourable to the borrower than heretofore. As a result of this step the facilities offered by the Corporation will henceforth be available through the Midland Bank as through the other member banks.

* * *

N.Z. Meat Producers' London Chief

The New Zealand Meat Producers' Board announces the appointment of Mr. S. A. Chisholm to be London Manager in succession to the late Mr. R. S. Forsyth.—*Reuter.*

* * *

Aviation Developments, Ltd.

Aviation Developments, Ltd., of Welwyn, manufacturers of the Chobert system of Blind Riveting, "Pip" Quick Release Pins and "Di" Shear and Cowling Fasteners, have recently announced the opening of a London office at Kingsbourne House, 229-231, High Holborn, W.C. 1.

From this address all sales service and administrative work will be carried out. A scheme has been devised whereby one or more members of the development staff will always be available at the London office to give technical information and authoritative advice on all products appertaining to their products.

The telephone number is Chancery 8601-3-3 and the telegraphic address Avidev., Holb., London.

* * *

Canning in Cumberland

The Cumberland Agricultural Committee is to investigate the possibility of developing the canning industry after the war. Now that canning methods have improved, that well-known delicacy Cumberland ham should command an even wider market in canned form. Beef, Herdwick mutton, vegetables and soft fruits could also be canned. All this would mean (states the *West Cumberland News*) a reorientation of outlook on the part of Cumberland farmers, for what is expedient in war-time may be inexpedient in peace-time. During the past four years, however, they have proved their adaptability. Thanks to the young farmers' movement, their sons and daughters are now as bold and enterprising as American business men. If the canning industry is to be one of the main planks in Cumberland's agricultural programme after the war then their wholehearted co-operation will be assured.

* * *

Brown and Bibby, Ltd.

Brown and Bibby, Ltd., colour printers, have purchased from Gregory's of Liverpool, Ltd., the factories at Speke, Liverpool 19, completed in 1939.

Situated on the new Liverpool-Widnes highway, and on a 10½-acre site, the factories aggregate 220,000 square feet, and will enable Brown and Bibby, Ltd., to bring the whole of their dispersed activities under the one roof immediately after the war.

The factories are of novel design and provide for the most flexible machine layout by virtue of the main span being 88 feet by 1,000 feet, free from stanchions or uprights of any kind.

Companies

Energen Foods Co., Ltd.

The following are excerpts from the chairman's statement submitted at the eighteenth ordinary general meeting of the company.

The sales of the company's products, particularly of Energen bread, continue to show a marked increase, due, no doubt, to the growing recognition of the need for digestive foods of high nutritive value, whilst the necessity for maintaining the protein in our daily ration of food is admitted by all medical authorities. The increase in our sales and some economies in cost have been accompanied by an increase in profits. As this result has been attained without raising selling prices, our shareholders will be interested to learn from the balance sheet that our earnings have enabled us to contribute £13,718 to the taxation of the country out of a total of £22,480, or over 60 per cent. of the profits of the company. Of the balance of £8,762 remaining, £6,000 is with your approval being distributed as dividends subject to income tax in the usual way, and a further sum of £2,500 placed to reserve.

It will be agreed that this is not the time for any lengthy description of the company's position, and that this statement and the balance sheet showing the reserves which are accumulating, fully covered by liquid assets, will be sufficient assurance to members that they can look forward with confidence to the post-war period, and enable them to share the general hope that this period is not too distant to prevent due encouragement for the future for their undertaking.

* * *

Spillers, Limited

At the Fifty-seventh Annual General Meeting of Spillers, Ltd., the chairman of the company, the Right Hon. Sir Malcolm A. Robertson, P.C., G.C.M.G., K.B.E., M.P., submitted to the meeting his statement, in the course of which he said that "the directors are glad that it has been possible to prepare accounts for the three years ended January 31, 1940, 1941 and 1942, and these have been laid before you. While a separate profit and loss account for each year is submitted, it was felt that no real purpose would be served by giving a balance sheet at any date other than January 31, 1942.

"This represents a considerable degree of progress, but still leaves the position two years in arrear, a state of affairs which, though inevitable in the circumstances, does not commend itself to the Board. You have been apprised in the past of the vast amount of extra detail work involved as a result of operating under control conditions, and while every effort will continue to be made to expedite the matter I do not consider that it will be possible—even at the best—to submit accounts less than one year in arrear so long as present conditions subsist.

"Turning now to the accounts before you, I must first emphasise that these are of a provisional nature. So far as they relate to flour milling operations the figures have not yet been agreed with the Ministry of Food. In addition the taxation liability arising on the company's results

during the period covered has not been determined with the Inland Revenue, and the provisions made for taxation should be regarded more from the standpoint of the three years as a whole than in relation to each particular year. In the ordinary course the directors would have preferred to await final figures, but they considered that by reason of the lapse of time since the last accounts were submitted to the stockholders it was desirable to present to you the most reasonably accurate statement which it was possible to prepare at this time.

"Consideration of the position has confirmed the view which I previously put to you, that, taking into account all relevant aspects of the situation, the terms of the arrangements between the Government and the milling industry are not generous to the millers, and supports the contention that these terms should be improved if only to the extent of recognising the output that has been achieved in excess of the pre-war level under conditions of the utmost difficulty and for which no profit or remuneration has up till now been paid. I think I may say not only of this company, but of the milling industry as a whole, that it has endeavoured to contribute to the war effort by attaining the maximum output with the fullest efficiency and economy possible under existing conditions without relying upon any financial incentive to greater effort. Such an incentive is unnecessary to responsible industry engaged in the production of vital supplies in time of war, nor is it sought as such. But some reasonable return for services performed by a key industry to enable it to make a modest provision against the grave difficulties which clearly lie ahead, if its position in the national economy is to be maintained, seems both advisable and just."

Overseas Items

Apple Syrup

Canada has been manufacturing apple syrup on a commercial basis for the past two years, from apples too small or unsuited for peeling.

The syrup was used in the tobacco industry as a glycerine substitute and also used in the baking industry, where it was found that bread and cakes made with the syrup retained their freshness longer.

* * *

New South Wales Pure Food Act

The New South Wales Government has just effected by legislation the first revision in thirty-five years of the New South Wales Pure Food Act, 1908.

* * *

Syrup from Wheat

A process for manufacture of syrup from wheat has been perfected in the United States, and commercial production at the rate of 1,000,000 pounds per month "is already under way," Cecil Lamont, vice-president of the North-West Line Elevators Association, announced in Winnipeg.

He said development of the wheat syrup was revealed at the recent United States farm chemurgic conference at St. Louis, Mo., from which he had just returned. The conference was attended by leaders of agriculture, industry and science from United States, Canada, South America and China.

The process was developed at the United States Government's northern research laboratory at Peoria, Ill., and the product now was being manufactured in a beet sugar plant. Its quality and taste equalled that of corn syrup.

With slight plant adjustment Canadian sugar beet plants could produce upwards of 60,000,000 pounds of wheat sugar annually, he said. There are two plants in Ontario, two in Alberta and one at Winnipeg.

* * *

Maize used as Carburation Spirit

A maximum quantity of 500,000 tons of maize per year is to be used for the extraction of ethyl alcohol for carburation spirit according to a recent Argentine Government decree. It is hoped that this measure will alleviate the nation's shortage of carburation spirit, and definite plans concerning financing of the project, etc., are at present in preparation.

The extreme shortage of carburation spirit in Argentina has been an ever-increasing handicap to the development of the country's industries. It is hoped that the above decree will solve the difficulties to a large extent, while, at the same time, making profitable use of the country's maize surplus.

The installation of adequate plants at the present juncture is considered rather difficult, but it is hoped that an increase of Argentine factory and distillery output will overcome these obstacles.

Experiments carried out by various State departments in the course of the last few years have led to the opinion that a mixture of naphtha and alcohol would produce an efficient and economic fuel for engines, and could also be used advantageously in various other industries.—*Reuter's Trade Service.*

* * *

New Carcase Dressing Process

Under a new carcase dressing process tried in Australia, sterilised air is injected by an air gun between the skin and flesh, which, it is claimed, not only greatly facilitates removal of the pelt, but results in a considerably improved skin, as well as improvement in the keeping qualities of the carcase meat. Following inspection of a lamb carcase, which had been in cold storage at Newport for over 14 months, the Meat Advisory Committee has appointed a sub-committee to enquire further into the possibilities of the new method known as the Roach air process of skinning and dressing sheep and lambs.

Chile to Grow Cotton and Sugar Cane

An agricultural association at Coquimbo, in the northern part of Chile, has carried out cotton cultivation on a large scale with very satisfactory results. The Chilean climate and conditions of the soil in that area have proved to be very favourable for the development of the plants. Recent sugar cane plantations in the same area have led to equally satisfactory results.

* * *

Chilean Husbandry and Cattle Raising

The General Chilean Agriculture Administration has drawn up a plan with a view to establishing, in various provinces of the country, mixed technical organisations composed of specialised staff of the Agricultural Administration and of farmers. These organisations are to further agricultural and cattle raising activities in the country, and their main aims are:

(1) To tighten and amplify the co-operation between farmers and technical staff.

(2) Establish permanent relations between agricultural organisations and officials of the Agricultural Administration.

(3) To bring about close co-operation among the various services.

(4) Investigate plans, one for immediate realisation, and another which is to be carried out in a few years' time, aiming at the furthering of a combined agricultural and cattle-raising industry in every province.—*Reuter's Trade Service.*

* * *

South African Markets

South African and Rhodesian wholesalers, manufacturers, and producers are planning post-war programmes, and many are seeking new overseas contacts as sources of supply or for demand.

To those interested in the South African markets and are not represented there, the services of a market research agency is available. John Barnard's agency could immediately introduce numerous wholesale distributors and manufacturers' representatives who wish to arrange tie-ups, preferably in an exclusive agency basis; as well as South African producers and exporters who require overseas representation.

* * *

Colonial Research Committee

Since the Colonial Research Committee published its first Progress Report four months ago, further interesting developments have taken place in the field of Colonial Research, and these are now surveyed in the Committee's First Annual Report published as a White Paper.

Plans under consideration when the Progress Report went to press have now been approved and another ten schemes, costing £191,000, recommended by the Committee have been approved for grants under the Colonial Development and Welfare Act, 1940.

The Report emphasises, however, that the setting up of a sound basic organisation is the Committee's first consideration, and that the list of specific researches is not as long as it would be if circumstances were normal. It is emphasised that the co-ordination of the whole range of Colonial Research is the Committee's primary aim, and the Report makes it clear that a considerable amount of ground work has been done in this direction.

Societies

Conference on Automatic Control

The Institution of Chemical Engineers and the Institute of Physics announce a joint conference on "Instruments for the Automatic Controlling and Recording of Chemical and Other Processes." Provisional arrangements have been made for the conference to take place in London on Friday afternoon, September 22, and Saturday morning, September 23. The purpose of the conference is to promote the interchange of knowledge and experience between those employing automatic controllers and recorders in different fields and to encourage collaboration between physicists and chemical engineers. The conference will be open to all interested, without charge, whether members of the organising bodies or not. Further particulars will be sent in August to those sending a request for them to the Organising Secretary, Joint Conference, c/o The Institution of Chemical Engineers.

* * *

The Royal Society

At a recent meeting of the Royal Society the following elections were made:

Fellow of the Royal Society under Statute 12: The Rt. Hon. S. M. Bruce, C.H. Foreign members: Dr. O. T. Avery (New York), Professor M. Lugeon (Lausanne), Professor T. Svedberg (Uppsala), Professor N. E. Svedelius (Uppsala), Professor S. Timoshenko (Ann Arbor, Mich.).

* * *

College of the Pharmaceutical Society

In the annual report of research work used by the College of Pharmaceutical Society (January, 1942-June, 1943) recently received the following papers published during the period are abstracted:

"Estimation of Vitamin A." Vit. A. Sub-comm. of A.F.F. Committee, *Nature*, 1943, **151**, 535-6.

"Differences in calcification between the Humerus and Femur of Young Rats receiving high Calcium, low Calcium and Stock Diets." Bruce, H. M. and Kassner, E. W. *Biochem. J.*, 1943, **37**, 103-9.

"The relative needs of young Male and Female Rats for Vitamin A." Coward, K. H. *B.M.J.*, Apr. 4, 1942, vol. i, 485.

"The Relation between the increase in weight of Rats during the dosing period of Vitamin A and B_1 determinations and the standard deviation of that increase." Coward, K. H. *Biochem. J.*, 1942, **36**, 795-6.

"The Biological Standardisation of the Vitamins"—a contribution to "Essays in Biology," prepared in honour of Professor Herbert M. Evans, University of California Press. Coward, K. H.

"The Availability of the Calcium of Milk." Coward, K. H., Kassner, E. W. and Waller, L. W. *B.M.J.*, July 10, 1943, vol. ii, 39.

News from the Ministries

Flour

The practice of dating flour labels was discontinued as from June 26, 1944. The Ministry of Food consider this change of procedure necessary to ensure the regular distribution of flour throughout the country during the forthcoming months.

This decision will be reviewed at a later date.

* * *

Cereal Fillers

The Minister of Food has made an Order (S.R. & O. 1944 No. 660) which revokes and replaces the Cereal Fillers (Control and Maximum Prices) Order, 1943 and its amendments (S.R. & O. 1943 Nos. 545 and 629). Cereal Filler is now defined as any rusk, meal or crumbs baked and of a description commonly used as a filler in the manufacture of articles of food containing meat or fish. The new Order authorises its use as a bait or mixture for destroying rats or mice.

* * *

Grouse Shooting Season

The date for the opening of the grouse shooting season in the United Kingdom will not be advanced this year. The season will accordingly open; as in pre-war years, on August 12.

The season for black game shooting will also revert to the pre-war date, which is August 20.

The suspension of the prohibition in England and Wales against the killing or taking of game on a Sunday or on Christmas Day will continue.

* * *

Crops in Glass Houses

The Ministry of Agriculture and Fisheries is obtaining a return of the area under glasshouse crops at July 4, 1944. Fuller and more regular information about glasshouse production is required by the Ministry and by War Agricultural Executive Committees, and it is hoped that glasshouse occupiers will assist them by completing their forms accurately and returning them as quickly as possible.

Manufacturing Meat

Fores of "cull" veal bone-in, suitable for manufacturing purposes, are available for distribution to manufacturers. And a limited quantity of imported beef cheek trimmings with the salivary glands, suitable for manufacturing purposes, is also available. Issues of these trimmings to manufacturers will not be counted against the manufacturer's allocation of manufacturing meat.

W.M.S. have been instructed that the following prices should be charged for these commodities as from June 26, 1944, until further notice: U.S.A. fores of "cull" veal (bone-in), 4½d. per lb.; imported beef cheek trimmings with salivary glands, 6½d. per lb.

* * *

Amendment to Home Grown Grain Order

The Minister of Food has made an Order (S.R. & O. 1944 No. 717) amending the Home Grown Grain (Returns) (Great Britain) Order, 1943 (S.R. & O. 1943 No. 1449). The new Order simplifies the form of return of their dealings in home grown grain to be furnished by approved buyers and seed merchants. The first monthly return to which the new form will apply is that for August, 1944, which must be rendered by September 8, 1944.

* * *

Mr. Harold Hobson

The Minister of Fuel and Power has appointed Mr. Harold Hobson, B.Sc., M.Inst.C.E., M.I.E.E., the present general manager of the Central Electricity Board, to be chairman of the Board in the place of Sir Archibald Page, M.Inst.C.E., M.I.E.E., who has resigned for health reasons as from July 31.

The Central Electricity Board announce that consequent upon the appointment of Mr. Hobson as chairman, they have appointed Sir Johnstone Wright, Chief Engineer, to succeed him as general manager. Mr. J. Hacking, Deputy Chief Engineer, has been promoted to be Chief Engineer.

Damage to Foodstuffs

Although up to the present the enemy attack in Southern England has resulted in little damage to foodstuffs, a few instances have been reported of damage by glass-splinters, as a result of blast. Food traders are accordingly advised to take such steps as they can to safeguard their stocks from this type of damage.

* * *

High-Speed Milk Clotting

Recent work at the National Institute for Research in Dairying, Reading, has produced from a commercial rennin preparation a crystalline substance capable of clotting ten million times its weight of warm milk in ten minutes. Preliminary experiments indicate that the substance is comparatively pure, and it is hoped that further work upon it will lead to the solution of various problems both in the manufacture of rennet and its use by the cheese-making industry.

* * *

Dehydration of Herrings

Colonel Llewellin (Minister of Food) in a written reply informed Mr. Boothby (U., East Aberdeen) that a pilot plant for research into the dehydration of herrings is being set up at Aberdeen. He will communicate any results that may be obtained to the House.

* * *

Thames Eels

The yearly operation of transferring elvers from the Severn to restock the Thames was carried out this time with some American co-operation. A million elvers were netted at the Ministry of Agriculture's depot at Epney, in Gloucestershire, and, in watered trays and ice-cooled cases, taken to three stretches of the Thames. As it happened, some Americans watched the performance, and an American sergeant was given the opportunity of launching the second elver group upon their career in the Thames. Later in the operations an Army film unit took pictures.

Elvers are now annually transferred from Severn to Thames as part of the programme of developing the eel fisheries. A Ministry of Food spokesman, however, said that eels were not being caught here on a large enough scale substantially to increase our diet and that the jellied eel was scarce because of the shortage of gelatine. The eel-eating season started this month, and Billingsgate reports that there is a great demand for the limited supplies of eels, even unjellied.

* * *

Bread Adviser for Scotland

The Minister of Food has appointed Mr. Angus McKenzie, the teacher of bread-making at the Royal Technical College, Glasgow, as a travelling bread adviser for Scotland. The Committee of the Technical College have kindly agreed to release him for this work.

Mr. McKenzie commenced his duties on July 1, and will be available to all bakers for advice and guidance in dealing with difficulties encountered in the production of their bread. Any baker wishing to avail himself of Mr. McKenzie's services should either write to the Director of Bread, Bryn Euryn, Colwyn Bay, or contact Mr. McKenzie direct at his home address, 206, Cambusnethan Street, Wishaw.

* * *

Bread Storage

During the summer months there is a danger of bread developing "rope" through incorrect storage. This trouble first shows itself when the bread develops a strong, sour, fruity odour, the crumb is damp and rapidly becomes sticky, making it very difficult to cut.

It is wrong to place bread in enclosed, ill-ventilated cupboards or tins or to shut it up before it is completely cool.

In order to avoid complaints and waste, always observe the following precautions, particularly during the summer months:

(1) The bread should be completely cool before it is stored away.

(2) The bread store or cupboard should be ventilated and should not be in a warm room, where cooking or serving is done.

Allocation of Herrings

The Ministry of Food has informed chairmen of Allocation Committees and Trade Associations that, following representations from the fishermen and the trade, it is considering a revision of the allocation lists for herrings at all ports. These lists contain the names of buyers to whom herrings are allocated on first landing when the price reaches the maximum, and are at present based on purchases made by the merchants in 1937 and 1938. The lists, if revised, may be based on a later datum period, and may take account of purchases during the present summer season. The object of any revision would be to give a more equitable share on allocation to those traders who buy heavily at times of glut when the price falls below maximum, but who at present are not on the rota or who hold only extremely small allocations.

The Ministry will ask all herring buyers for information regarding their purchases and disposals of herrings month by month, beginning with May and June this year. The necessary forms will be issued shortly. Traders are asked, in their own interest, to return these forms to the Ministry as quickly as possible.

* * *

Artificial Insemination of Cattle

The Minister of Agriculture and Fisheries has recently arranged for a review of the principles on which the development of artificial insemination centres in England and Wales should be planned and controlled under the powers conferred upon him by Section 17 of the Agriculture (Miscellaneous Provisions) Act, 1943. Discussions have taken place with the National Cattle Breeders' Association, the National Farmers' Union and the Milk Marketing Board, and it is proposed to make the following arrangements for the future development of the artificial insemination of cattle in this country.

It is considered that artificial insemination centres should be controlled and developed as a national service on behalf of the livestock industry and that, with the exception of centres established for experimental purposes, licences for such centres should be granted in future only to organisations controlled and financed by producers, such as the Milk Marketing Board, farmers' co-operative societies and the Cattle Breed Societies. It would be a condition of the licence that the centre would be available to all producers of cattle within the area of operation.

Experience in this country and abroad has shown that adequate capital resources and proper organisation and business management of centres are essential. It is accordingly intended that the issue of a licence shall be conditional upon the appointment of a competent local committee, representative of breeders and farmers in the area, to advise on all matters affecting the working of the centre.

A Central Advisory Committee is being appointed to advise the minister upon the economic aspects of the control and development of centres and to consider applications for licences to set up such centres. The chairman and eight members are being appointed by the Minister and four members each by the Milk Marketing Board, the National Farmers' Union, and collectively by the Cattle Breed Societies. A further announcement will be made about the actual personnel of the Committee.

* * *

Control of Black Aphis on Sugar Beet

In collaboration with the British Sugar Corporation, the British Sugar Beet Seed Producers' Association and the National Farmers' Union, arrangements have again been made by the Ministry of Agriculture whereby machines operated by Messrs. Pest Control, Ltd., will be available this season to deal with black aphis infestations.

The methods of control are (1) machine dusting of fields by nicotine, which, carried out on a large scale, has resulted in a kill of about 95 per cent., and (2) gassing with vaporised nicotine by special high clearance tractors, which has achieved a mortality approaching 100 per cent. Gassing is preferable where the foliage is much rolled or crinkled, or

where a very rapid kill is required.

This service is intended primarily to safeguard crops of sugar beet seed and sugar beet from attack by this pest. Subject to this consideration the machines will also be available to deal with infested crops of other seeds, peas, beans, strawberries, and Brussels sprouts, particularly in sugar beet growing areas.

Successful control requires correct scientific advice and accurate timing of treatment. A grower who observes black aphis on his beet crop is therefore asked immediately to inform his factory fieldman or, where the crop is grown for seed, his contracting seed merchant, so that the necessary arrangements for treatment can be made without delay. Outside the eastern counties the provincial advisory entomologist should also be notified.

Information as to charges for treatment, procedure, etc., in respect of sugar beet seed, sugar beet and other crops may be obtained from Messrs. Pest Control, Ltd., at Harston, Cambridge, or the company's sub-offices at Holbeach, Lincs., West Malling, Kent, and Broadway, Worcs.

* * *

Agricultural Education

The Minister of Agriculture and Fisheries and the President of the Board of Education have jointly appointed a Committee to advise them on all aspects of agricultural education to be provided by local education authorities, and particularly on the educational policy and methods of training to be adopted at farm institutes.

The Committee will be a permanent body and will advise the two Ministers on such matters within their terms of reference as they think fit and on any questions on agricultural education up to and including farm institute level that may be referred to them.

The chairman of the Committee is Dr. Thomas Loveday, M.A., Vice-Chancellor of Bristol University, who was a member of Lord Justice Luxmoore's Committee on Post-war Agricultural Education, and is Chairman of the Ministry's wartime committee on Higher Agricultural Education.

The Minister of Agriculture has also appointed a Committee to consider the character and extent of the need for higher agricultural education in England and Wales and to make recommendations as to the facilities which should be provided to meet the need. This Committee will deal with agricultural education provided by agricultural colleges and university departments of agriculture, and will take over the functions of the Ministry's war-time Committee on Higher Agricultural Education.

The chairman is Dr. Loveday.

The Secretary of both Committees is Mr. F. L. Wormald, Ministry of Agriculture and Fisheries, Block 4, Bickenhall Mansions, Baker Street, W 1.

* * *

Herring Meal

With the completion of negotiations by the Food Ministry to buy Iceland's surplus stocks of processed herring, additional herring oil and meal will be available in this country.

The meal has an oil content of about 10 per cent. and a protein content of between 65 and 70 per cent.; and, by adding it to national pig and poultry foods, it should substantially improve their content. Incidentally, it will save for other purposes the small amount of cod liver oil now being inserted in pig and poultry foods.

The imported herring oil will be used mainly for lubricating and other engineering purposes.

* * *

Water-Saving Ideas

Some factories can have a plentiful supply of clean water simply by putting in the necessary piping. But for the majority of places there must be a pumping system, either at the factory or at the local source of supply.

Pumping calls for power and power calls for fuel. So every gallon of water that can be saved, besides easing the water supply position, saves precious fuel.

The obvious way to save water is to cut down the demand wherever possible. But generally it is difficult (or seems difficult) to make straight cuts without interfering with factory services.

Yet substantial savings in water consumption *can* be made, without causing interference or disturbance, if tackled the right way.

A new bulletin, just out, gives a number of water-saving ideas from which to choose to suit different conditions.

The first step is to find out where water is being used and how much is used at each point. The consumption figures are compared with the *minimum* needs at each point of usage. Tackled in a way described in the bulletin, this first step will show at a glance where the greatest results are likely to be obtained.

Armed with that clear picture of the possibilities it is possible to examine ways and means of getting the results which are aimed at.

The bulletin sets out these ways and means in a very practical fashion, taking the reader stage by stage through drinking-water services; washing, lavatories and other domestic uses; boiler feed supply; process uses and cooling systems.

There are some very useful notes on the various causes of water fouling and how they can be remedied. Another section of the bulletin deals at length with mechanical and chemical methods of cleaning water mains and plant. At the end is an appendix on pressure loss in pipe lines.

Without doubt, this latest addition to an excellent series of fuel efficiency publications will well repay study by factory management. The large savings of water which are made possible by a systematic search, using the bulletin as a guide, can have far-reaching results in other directions. It is so often the case that a saving (sometimes in itself small) begets other and greater savings.

The bulletin is Fuel Efficiency Bulletin No. 31, and copies can be obtained from the Regional Fuel Efficiency Committee.

* * *

Golden Wedding

Mr. and Mrs. George Ellison celebrated their golden wedding on July 21, 1944.

Mr. Ellison is the founder and governing director of George Ellison, Ltd., and of Tufnol, Ltd.

Information and Advice

Emulsification of Essential Oils

9,156. *Required, information relative to the emulsification of essential oils to effect complete solubility in a weak sugar syrup (1 lb. per gallon).* (Herts.)

It is impossible to utilise essential oils, whether emulsified or in any other forms, in such a way as to effect complete solubility in weak sugar syrup or, in fact, in any other syrup.

Terpeneless oils are commonly used after preliminary extraction with solvents.

Ordinary emulsions could, of course, be prepared with the aid of gums, as described in the literature, but when these are added to syrup a cloudy preparation results.

Frozen Bacon

9,250. *There has been a considerable increase in pig production in Kenya Colony. After the war we are looking forward to working up a regular export trade for green Wiltshire sides of bacon to the English market. Several small experimental shipments were made to London before the war at chilling temperatures, but we came up against the time factor with the result sliming took place with several consignments, due, of course, to the length of time taken in transit.*

We are writing to ask if, in order to assist the development of mixed farming in this Colony, you will be good enough to give us whatever information you can on the subject of frozen bacon. In particular, we are most anxious to know if frozen bacon is likely to be acceptable on the home market once world supply conditions return to normal. For us to freeze bacon prior to shipment would certainly solve this time factor, which is quite our most difficult problem. (Kenya Colony.)

Transportation of frozen bacon from Kenya is a more difficult problem than the transport of frozen pork, but as we understand that you do not produce pigs, your interest will be solely in regard to bacon.

We are informed that the importation of bacon into this country after the war will be controlled. It is too early, however, to say whether a quota system for the various countries on the system of the pre-war quotas will be revived. There would seem to be no reason why Kenya should not participate in any such system of quotas provided that the Colony can deliver the product in proper condition.

Your chief problems may be: (*a*) refrigerated transport from the factory to the seaboard and (*b*) refrigeration from Mombasa to England. On these two points the factory can probably obtain the soundest information locally—from the railway authorities and the shipping agents respectively.

The public reaction to frozen bacon is difficult to assess. There is no reason to expect any objection to it provided that it conforms to the standards of Wiltshire sides from Denmark, Canada and from our own factories. Doubt is expressed, however, whether, after de-frosting, such bacon will keep as long as bacon that has not such difficult transport problems.

Canned hams are a line in which there may be an opening in this country—again provided that the product can be transported satisfactorily. Canned hams are popular with a large section of the catering trade. Before the war considerable quantities were imported from France and other European countries. It would be reasonable to assume, however, that canned hams would be included in any quota for bacon that may be granted to Kenya after the war.

The quota policy before the war was the United Kingdom first, the Empire second, and foreign countries third. Time alone can say whether post-war supplies will be regulated in that manner or in any modification of it.

The importation of frozen pork from Kenya is an easier proposition than that of frozen bacon. Before the war, quantities of frozen sides of pork were imported from New Zealand and cured in this country. This bacon was indistinguishable from English bacon and therefore sold as readily as any other bacon. There would seem to be no reason why Kenya could not supply frozen sides of pork after the war. British bacon curers have already expressed not only their willingness but their desire to purchase frozen sides. Their view is that the supply of home-produced pigs after the war will still be either insufficient to provide an economic throughput or too erratic to provide an economic throughput at all seasons. Supplies of frozen pork from New Zealand were tending to increase up to the outbreak of war; but it is, of course, impossible to say at present whether or in what manner its importation will be controlled after the war. This product was useful for consumption as pork as well as for curing.

Information Supplied

9,184. *Likely manufacturers of machinery required for milling soya flour from soya beans.* (Lancs.)

9,185. *Source of supply of paper or snap-on lids for 1- and 2-lb. glass jars.* (Manchester.)

9,187. *Packing machine for bouillon soup cubes.* (New Zealand.)

9,190. *Machinery for crimping Cellophane bags of approximate size of 2¼ ins. by 2 ins.* (Middlesex.)

9,193. *Names and addresses of firms specialising in the construction of machinery for the hydrogenation of oils and the dehydration of vegetables and foods.* (Alexandria.)

9,194. *Manufacture of potato flour.* (Herts.)

9,201. *Details of equipment for fruit and vegetable canning.* (Scotland.)

9,207. *Information concerning "butter flavour."* (Alexandria.)

9,213. *Information concerning an electrical instrument which will give, as a percentage, a direct reading of the moisture of certain raw or manufactured materials.* (London.)

9,216. *Sources of supply of bay leaves, root ginger, whole black peppers, and whole cloves.* (Ayrshire.)

9,222. *Information regarding the possibilities of the use of gas for fruit canning.* (Lancs.)

9,224. *Information regarding restrictions on the supply of raw materials for the manufacture of sauces.* (London.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

The Recovery of Tocopherol (Vitamin E) and Valuable By-Products from Vegetable Oils

This invention relates to improvements in the treatment of saponifiable oils, and it is especially concerned with the recovery therefrom of tocopherol (vitamin E) in relatively concentrated form. Prior methods of concentrating tocopherol from wheat germ and similar oils have all included alkaline saponification. This is objectionable because tocopherol is known to be unstable in alkaline solutions, while a further difficulty encountered arises from the presence of sterols and carotinoid pigments, which are difficult to remove without loss of tocopherol.

The improved method of receiving tocopherol (vitamin E) from vegetable oils comprises treating them dissolved in an organic solvent with cold concentrated sulphuric acid and then separating the organic solvent-phase and evaporating the solvent. This leaves a clear, colourless oil free from sterols, and which contains from five to ten times the tocopherol content of the original oil.

It is advisable to wash the separated solvent-phase before evaporating the solvent with dilute alkali in order to remove the traces of sulphuric acid and sulphonated compounds which may be present. The preferred solvent to use is petroleum ether, although other inert solvents which do not readily react with sulphuric acid, such as acetone, may likewise be employed. The concentration of the sulphuric acid should be from 85 to 88 per cent.

The separated acid phase may be diluted with water and the resulting white precipitate filtered and washed free of acid. The residue so secured has the properties of a detergent and it can be extracted with ethyl ether to yield an oil having anti-oxidant properties.

The sulphuric acid treatment removes up to 90 per cent. of the oil and it is especially applicable to wheat germ oil. The tocopherol-containing extract is free from sterols and carotinoid pigments and it does not respond to the Liebermann-Bourchard reaction for sterols nor the Carr-Price reaction for carotinoid pigments.

549,931. The Ogilvie Flour Mills Company, Ltd. (Montreal).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

560,043. PEAK, FREAN AND CO., LTD., and RONDOLIN, L.: Biscuit-making machinery.

560,077. DISTILLATION PRODUCTS, INC.: Method for preparing substances having vitamin A activity.

560,529. POTTS, H. E. (DISTILLATION PRODUCTS, INC.): Preparation of stabilised edible substances.

560,569. SVENSKA JASTFABRIKS AKTIEBOLAGET: Extraction or expulsion of water and other liquid from yeast suspensions.

560,624. KING, A., JOHNSON, S., and JOHNSON, E.: Treatment of flour and the manufacture of biscuits.

560,631. WINTHROP CHEMICAL CO., INC.: Water-soluble riboflavin compositions.

560,673. POINTON, J. E., and BAKER PERKINS, LTD.: Baking ovens.

560,675. GOULDEN, J., and IMPERIAL CHEMICAL INDUSTRIES, LTD.: Processes and apparatus for mixing liquids.

560,685. VICARS, LTD., T. AND T., CROSLAND, E. M., and NAYLOR, J. F.: Dough-moulding and dough-sheeting machinery.

560,713. ARMSTRONG CORK CO.: Closures for bottles, jars or the like.

560,731. ROBINSON AND SON, LTD., T., and SMITH, L.: Machines for spraying or moistening granular and powdered materials.

560,800. THAYSEN, A. C., and MORRIS, M. B.: Production of strains of yeast suitable for food purposes.

560,846. CALCRAFT, E. G.: Vegetable and like slicers.

560,861. SMITH, C. A. V., ABELES, P. W., and PICK, S. J.: Precast reinforced concrete tanks or containers for liquids or finely divided materials.

560,886. SMITH, W. A.: Grinding or crushing machines.

560,933. INNES, R. J., and WHATTON, E. H.: Securing the cooling of air passing into cupboards and other food receptacles.

560,954. WEERTH, H. K. DE: Machines for cooking, dehydrating and/or cooling foodstuffs or industrial products.

560,975. ROBINSON AND SON, LTD., T., and ORMEROD, H.: Grain-drying and conditioning machines.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

SILVER SPOON.—627,036. Flour, custard powder, blancmange powder, cornflour, rice, preparations for leavening; ice cream powder, soup flour, soup paste, soup flavourings, and farinaceous preparations for making gravy. **Joseph Lingford and Son, Ltd.**, 5, Durham Street, Bishop Auckland, Durham.

PHILEX.—627,072. Yeast, yeast extract; preparations of yeast for food or for use as ingredients in food for human consumption. **Phillips Yeast Products, Ltd.**, Park Royal Road, London, N.W. 10.

OLAVIT.—627,146. Flour and bread. **Joseph Glover, Ltd.**, Valley Mills, Sheffield Road, Killmarsh, near Sheffield.

New Companies

Flour Importers (Distribution Control), Association, Limited. (386836.) College Hill Chambers, E.C. 4. Management Committee: J. G. Carson, 21, Ralson Road, Bearsden, Dumbartonshire; E. A. Green, Low Garth, Dartnell Park Road, Byfleet; E. A. Keay, Lethendy, Busby, Lanarkshire; W. R. Law, 1, Westbourne Gardens, Glasgow; J. H. Pillman, Briars Cross, Limpsfield, Surrey.

John Favours, Limited. (386880.) Cavendish House, 41, Waterloo Street, Birmingham. To carry on bus. of manufacturing confectioners, grocers, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: Not named. Subs.: E. G. Jordan, 55, Hesketh Crescent, Birmingham; L. G. Clark, 51, Charlotte Road, Birmingham, 15 (acct.).

S. B. Woodward and Son, Limited. (387075.) 72A, Rodney Street, Liverpool, 1. To carry on bus. of produce merchants, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: J. R. Woodward and Eva K. Woodward, both of High Seat, Hillside Road, Heswall, Wirrall; and J. Carter, 8, Moorside Road, Liverpool, 23.

Amarant, Limited. (387079.) To enter into an agreement with Casimir S. Piestrak and to carry on bus. of manufacturers of and dealers in food and beverages, bakers, confectioners, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: C. S. Piestrak, 109, Lancaster Gate, W. 2; J. W. Blake, Woodferris, Welwyn, Herts.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.